

# Service Manual

## REPAIR & ADJUSTMENTS



ORDER NO.  
ARP-307-0

FM/AM DIGITAL SYNTHESIZED TUNER

# TX-940

MODEL TX-940 COMES IN SEVEN VERSIONS DISTINGUISHED AS FOLLOWS:

Type	Voltage	Remarks
KU	AC120V only	U.S.A. model
HE	AC220V, 240V (switchable)	European continent model
S	AC110V, 120V, 220V, 240V (switchable)	General export model
S/G	AC110V, 120V, 220V, 240V (switchable)	U.S. Military model
SS	AC110V, 120V, 220V, 240V (switchable)	South Africa model
YP	AC240V only	Australia model
HEZ	AC220V, 240V (switchable)	West Germany model

- This service manual is applicable to the KU type. For servicing of the HE, YP, S, S/G and SS types, please refer to the PP 23 – 40.
- For servicing of the HEZ type, please refer to the Additional Service Manual.
- For the circuit descriptions, please refer to the TX-940, TX-540, F-50 service manual (ARP-353-0).
- Ce manuel d'instruction se réfère au mode de réglage, en français,
- Este manual de de servicio trata del método de ajuste escrito en español.

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**PIONEER ELECTRONIC CORPORATION** 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan

**PIONEER ELECTRONICS (USA) INC.** 1925 E. Dominguez St., Long Beach, California 90810 U.S.A.

**PIONEER ELECTRONIC (EUROPE) N.V.** Keetberglaan 1, 2740 Beveren, Belgium

**PIONEER ELECTRONICS AUSTRALIA PTY. LTD.** 178-184 Boundary Road, Braeside, Victoria 3195, Australia

# 1. SPECIFICATIONS

## FM Tuner Section

Frequency Range	87.5~108.0MHz
Usable Sensitivity	Mono; 10.8dBf (0.95μV), 75Ω
50dB Quieting Sensitivity	Mono; 16.2dBf (1.8μV), 75Ω Stereo; 37.2dBf (19.8μV), 75Ω
Sensitivity (DIN)	Mono; 1μV/75Ω Stereo; 42μV/75Ω
Signal-to-Noise Ratio (at 85dBf input)	Mono; 85dB Stereo; 80dB
Signal-to-Noise Ratio (DIN)	Mono; 77dB Stereo; 60dB
Total Harmonic Distortion	Mono; 0.05% (1kHz) Stereo; 0.08% (1kHz)
Capture Ratio	1.0dB
Alternate Channel Selectivity	400kHz; 56dB
Stereo Separation	1kHz, 50dB
Frequency Response	30Hz~15kHz $^{+0.5}_{-1.0}$ dB
Image Response Ratio	50dB
IF Response Ratio	80dB
Spurious Response Ratio	70dB
AM Suppression Ratio	60dB
Muting Threshold	30dBf (8.5μV), 75Ω
Antenna Input	300Ω balanced 75Ω unbalanced

• The above figures are measured values obtained under the new IHF method.

## AM Tuner Section

Frequency Range	522~1611kHz
Usable Sensitivity (accessory loop antenna)	150μV/m
Selectivity	40dB
Signal-to-Noise Ratio	50dB
Image Response Ratio	40dB
IF Response Ratio	60dB
Antenna	Loop antenna (supplied)

## Output Section

Output Terminals (Output Level)	
FM (100% MOD)	Fixed 700mV
AM (30% MOD)	Fixed 150mV

## Miscellaneous

Power Requirements	
KU model	AC 120 volts, 60Hz
S, SS, S/G models	AC110V/120V/220V/240V (switchable), 50/60Hz
YP model	a.c. 240 volts ~, 50Hz
HE type	a.c. 220V/240V, 50/60Hz
Power Consumption	
KU model	8 watts
HE, YP, S, SS and S/G models	8.5 watts
Dimensions	420(W) x 60(H) x 223(D)mm 16-9/16(W) x 2-3/8(H) x 8-13/16(D) in
Weight	2.5kg (5 lb 8 oz)

## Furnished Parts

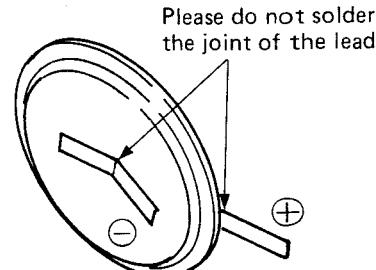
T-type FM Antenna	1
AM Loop Antenna	1
Connection Cord with Pin Plugs	1
Operating Instructions	1

### NOTE:

Specifications and design subject to possible modification without notice.

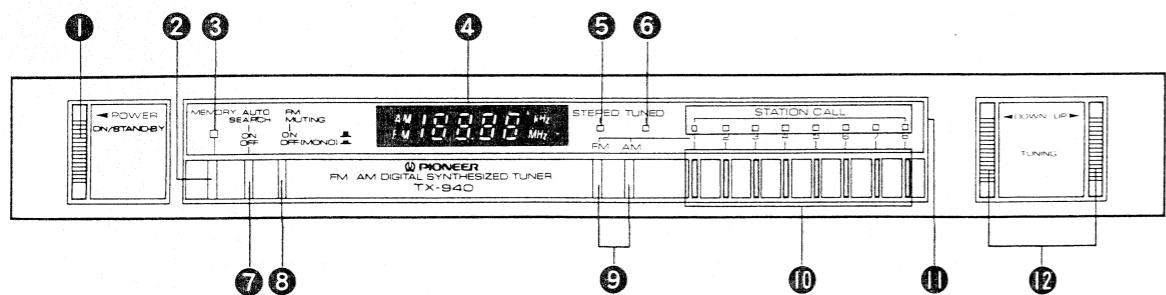
## PRECAUTIONS ON LITHIUM BATTERY

1. Solder it at the ends of the leads prewelded to the battery in the factory.
2. Be sure to use it within the specified temperature limits. (100°C)
3. Do not short the battery.  
Do not dispose it in fire.  
Do not try to recharge it.  
Do not mis-connect its polarity (+/-).  
Do not disassemble it.  
Do not expose it to water.
4. Please refer to the schematic diagram when replacing it.



Lithium Battery (AEX-008)

## 2. FRONT PANEL FACILITIES



### 1 POWER SWITCH (POWER)

When this switch is set to the ON position, power is supplied to the tuner's main circuits. The unit's power switch is geared to selecting the transformer's secondary and so even at the STAND-BY position, the unit's circuitry will work as long as the power cord is connected to the power outlet. Disconnect the power cord from the AC power outlet when the unit is not in regular use.

### 2 MEMORY SWITCH

This switch is pressed when presetting the frequency of a broadcast station into one of the STATION CALL switches. Once the station has been preset (or memorized), all you have to do in order to tune in that station is simply press the STATION CALL switch. In other words, there is no need to tune in the same station again every time you want to listen to a program using the tuning switches.

### 3 MEMORY INDICATOR

This lights when the MEMORY switch is pressed. A station can be preset into one of the STATION CALL switches while this indicator is lighted.

### 4 FREQUENCY DISPLAY

This indicates the frequency of the station which has been picked up. The frequency is displayed in MHz units for the FM band and in kHz units for the AM band.

### 5 STEREO INDICATOR

This lights when an FM stereo station has been picked up.

### 6 TUNED INDICATOR

This lights when a station is picked up. Operate the TUNING switches so that this indicator lights. It will not light, however, if a station's signals are too weak, even if the frequency of that station has been tuned in properly.

### CAUTION WITH AUTO-SEARCH:

- Since this is a highly sensitive mechanism, the frequency search operation may stop even with weak foreign broadcasts, particularly at night. Also, frequency noise in large cities may also cause the search operation to stop.
- When using Auto-Search to preset AM stations, if the frequency search operation stops too frequently, changing the position of the AM loop antenna may be of help in reducing its sensitivity so that only powerful, nearby stations are received. After tuning in the station, be sure to reposition the antenna to its best position for reception.
- For very weak stations, use the manual tuning mode to preset stations.

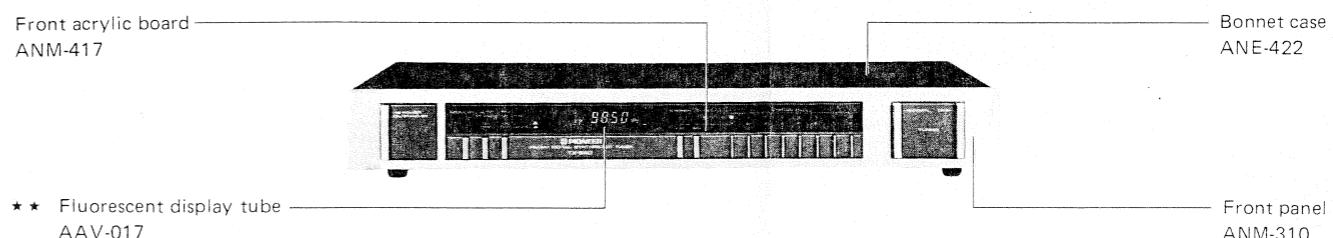
## 3. PARTS LOCATION

### NOTES:

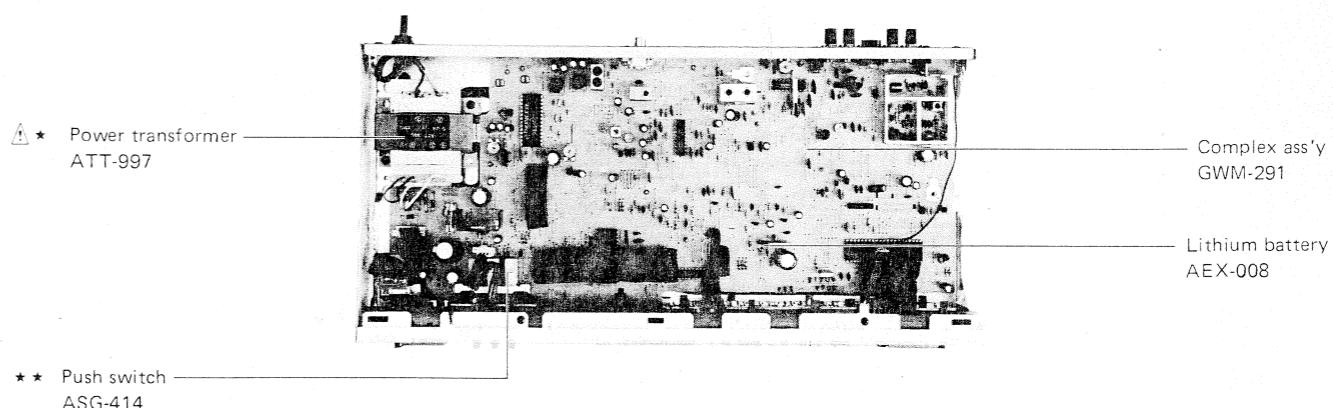
- The mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.
- ★★ GENERALLY MOVES FASTER THAN ★

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

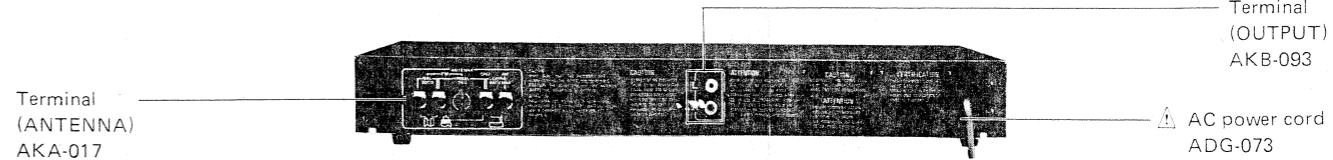
### Front Panel View



### Top View



### Rear Panel View



## 4.

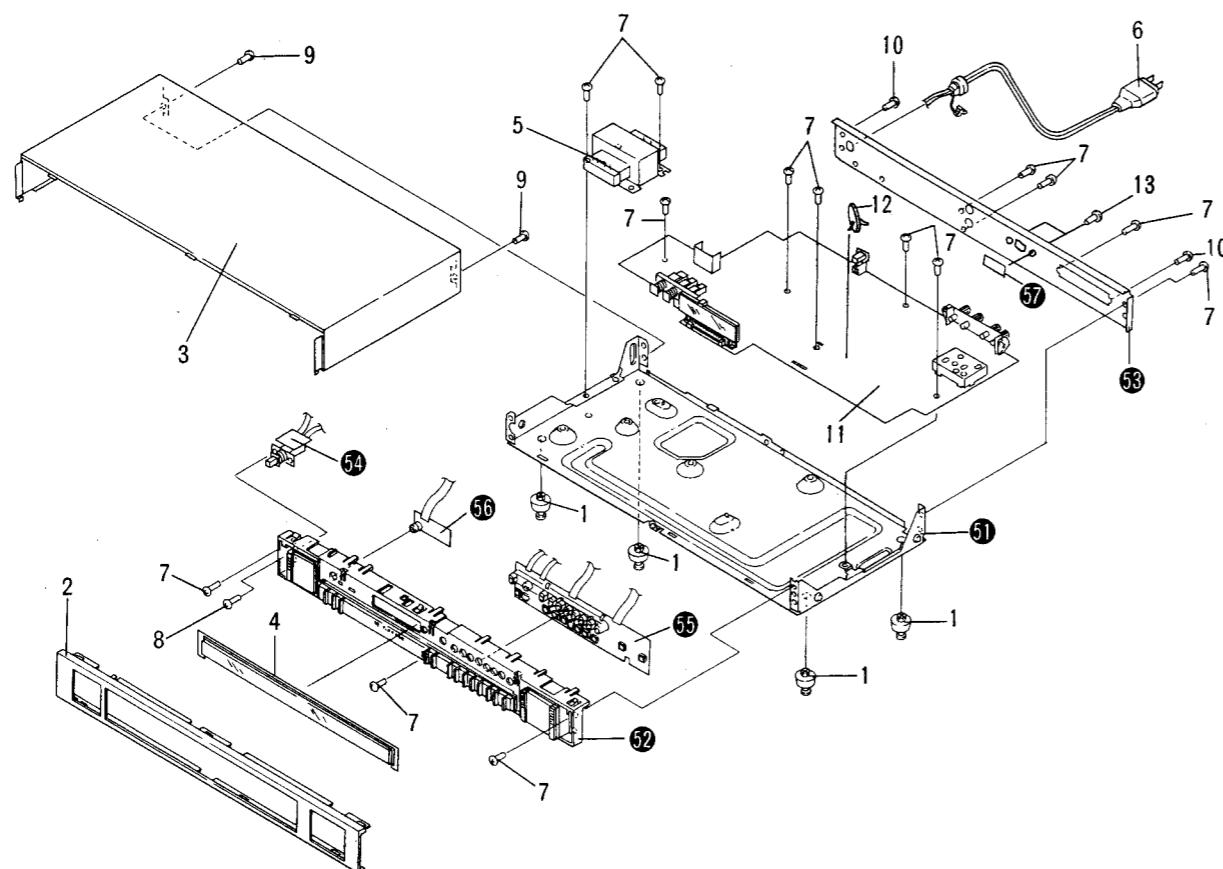
Parts

Mark

⚠

⚠

## 4. EXPLODED VIEW



### Parts List

#### NOTES:

- Parts without part number cannot be supplied.
- The **▲** mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.
- For your Parts Stock Control, the fast moving items are indicated with the marks **★★** and **★**.

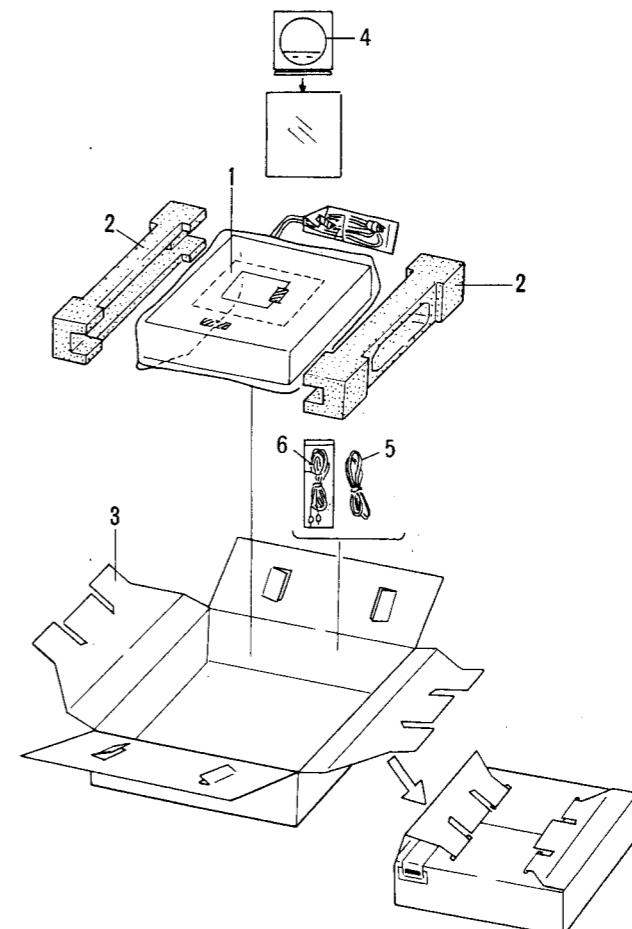
**★★ GENERALLY MOVES FASTER THAN ★**  
This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

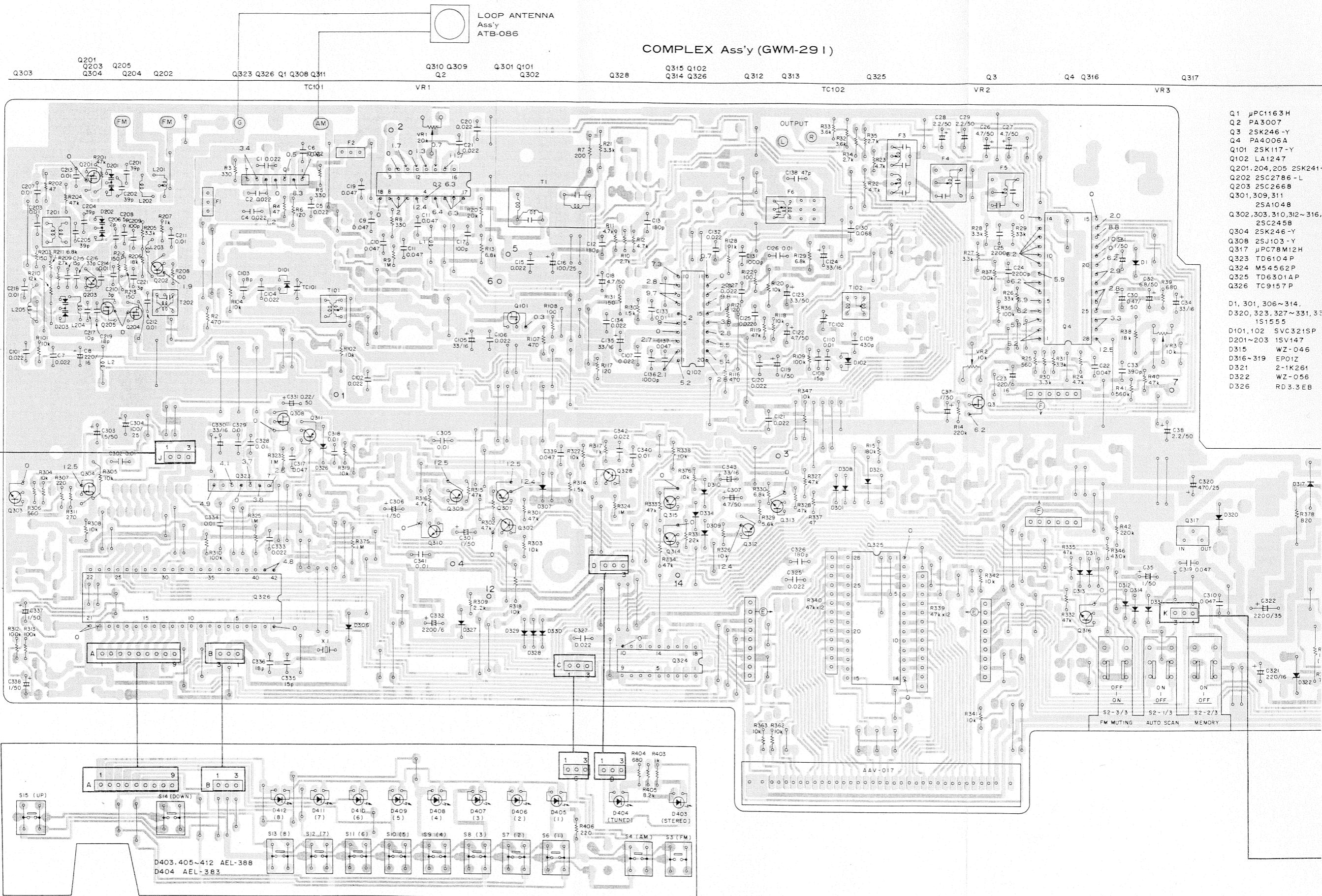
Mark	No.	Part No.	Description	Mark	No.	Part No.	Description
	1.	AEC-903	Leg ass'y		11.	GWM-291	Complex ass'y
	2.	ANM-310	Front panel		12.	AEX-008	Lithium battery
	3.	ANE-422	Bonnet case		13.	PMZ30P040FZB	Screw (3x4)
	4.	ANM-417	Front acrylic board		51.		Chassis
▲ ★	5.	ATT-997	Power transformer		52.		Panel stay ass'y
▲	6.	ADG-073	AC power cord		53.		Rear panel
	7.	BBZ30P080FZK	Screw (3x8)		54.		Power switch ass'y
	8.	PMZ30P060FMC	Screw (3x6)		55.		LED ass'y
	9.	BBT30P080FZK	Screw (3x8)		56.		LED ass'y S
	10.	ABA-115	Screw		57.		Switch ass'y 1

## 5. PACKING

### Parts List

Mark	No.	Part No.	Description
1.	ARB-558		Operating instructions
2.	AHA-341		Side pad
3.	AHE-198		Packing case
4.	ATB-086		Loop antenna ass'y
5.	ADH-005		FM antenna
6.	ADE-015		Connection cord



1 2 3 4 5 6  
6. P.C.BOARD CONNECTION DIAGRAM

A

B

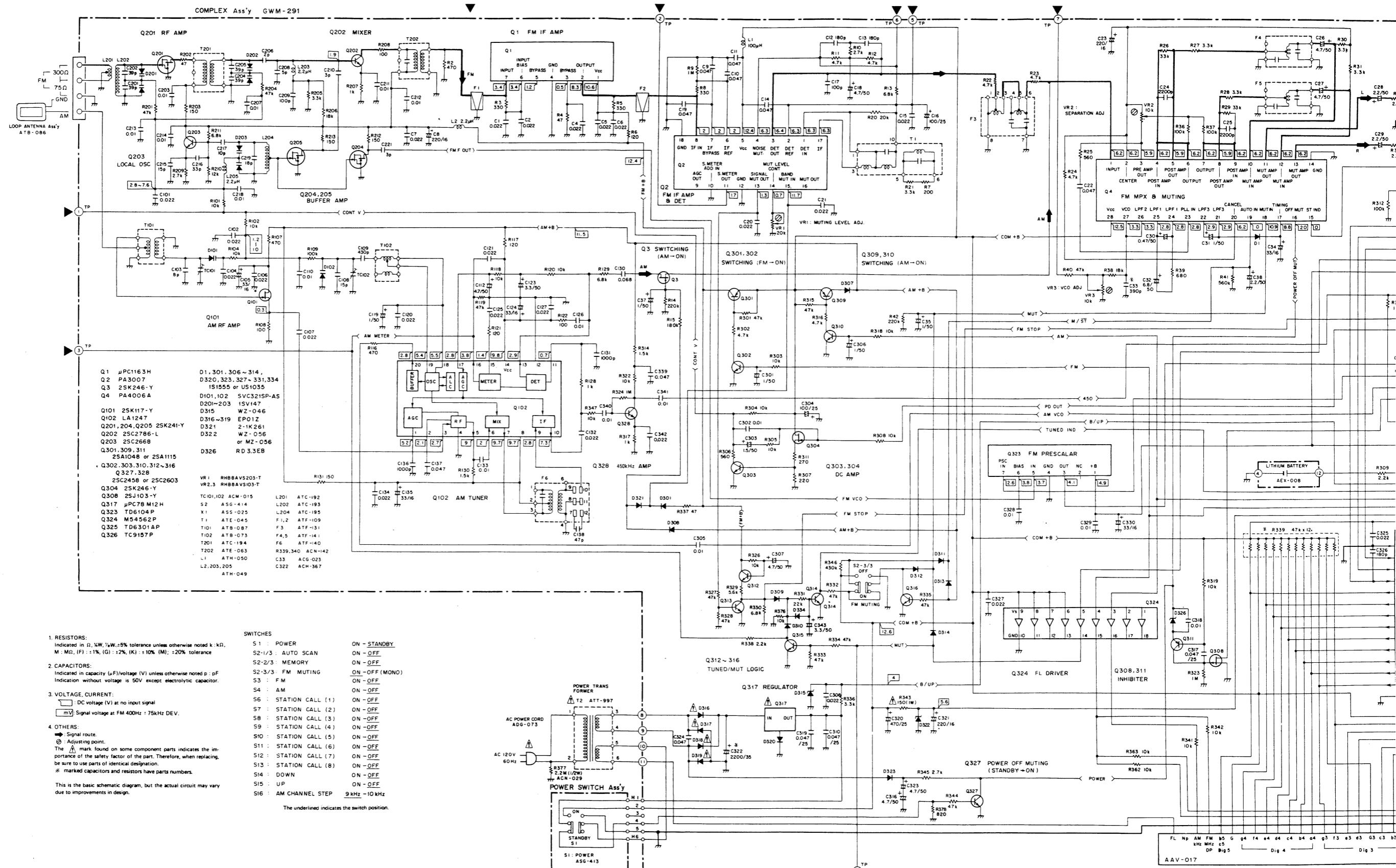
C

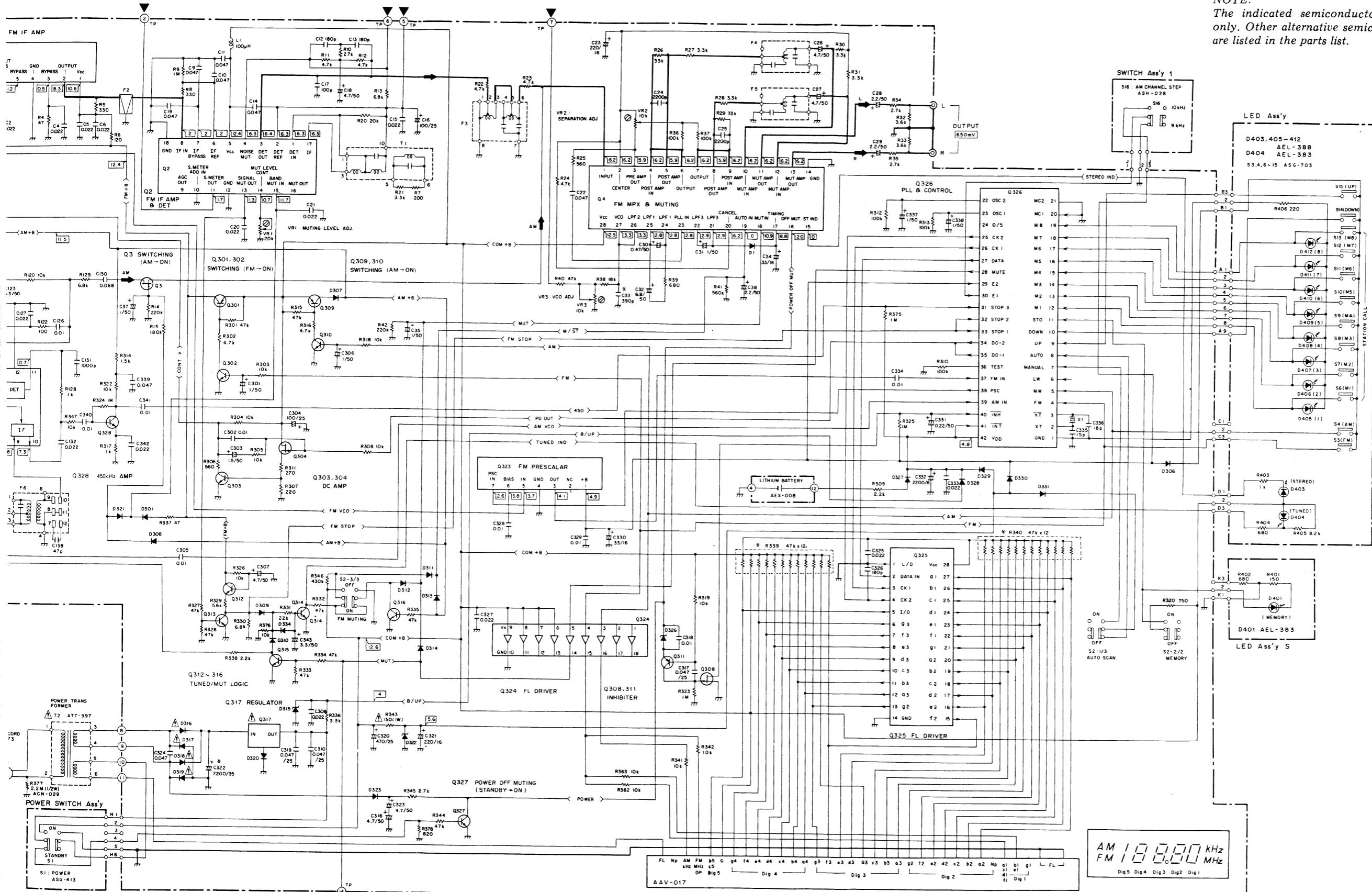
D

1 2 3 4 5 6  
7 8 9 10 11 12



## 7. SCHEMATIC DIAGRAM





*NOTE:*

**NOTE:**  
The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

A

B

C

D

## 8. ELECTRICAL PARTS LIST

## NOTES:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J=5%, and K=10%).

560Ω 56 × 10<sup>1</sup> 561 . . . . . RD%PS 561 J  
47kΩ 47 × 10<sup>3</sup> 473 . . . . . RD%PS 473 J  
0.5Ω 0R5 . . . . . RN2H 0R5 K  
1Ω 010 . . . . . RS1P 010 K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10<sup>1</sup> 5621 . . . . . RN%SR 5621 F

The mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

For your Parts Stock Control, the fast moving items are indicated with the marks ★★ and ★.

★★ GENERALLY MOVES FASTER THAN ★

This classification shall be adjusted by each distributor because it depends on model number, temperature, humidity, etc.

## Miscellaneous Parts

Mark	Part No.	Symbol & Description
GWM-291		
	Complex ass'y	
	Power switch ass'y	
	LED ass'y	
	LED ass'y S	
	Switch ass'y 1	
ACN-029	R377	Carbon composition
AEX-008		Lithium battery
★ ATT-997	T2	Power transformer
ADG-073		AC power cord

## Complex Assembly (GWM-291)

## SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★★ 2SC2786-L	Q202	
★★ 2SC2668	Q203	
★★ 2SC2458	Q302, Q303, Q310, Q312~Q316, (2SC2603)	
★★ 2SA1048	Q301, Q309, Q311 (2SA1115)	
★★ 2SK246-Y	Q304, Q3	
★★ PA3007 (PA3007-A)	Q2	
★★ PA4006-A (PA4006)	Q4	
★★ LA1247	Q102	
★★ M54562P	Q324	
★★ TC9157P	Q326	
★★ TD6301AP	Q325	
★★ TD6104P	Q323	
★★ μPC1163H	Q1	

Mark	Part No.	Symbol & Description
★★ μPC78M12H	Q317	
★★ 2SK117-Y	Q101	
★★ 2SK241-Y	Q201, Q204, Q205	
★★ 2SJ103-Y	Q308	
★ SVC321SP-AS	D101, D102	
★ 1SV147	D201~D203	
★ EP01Z	D316~D319	
★ WZ-046	D315	
★ WZ-056 (MZ-056)	D322	
★ RD3.3EB	D326	
★ IS1555 (US1035)	D1, D301, D306~D314, D320, D323, D327~D331, D334	
★ 2-1K261	D321	

## SWITCH

Mark	Part No.	Symbol & Description
★★ ASG-414	S2	Push switch

## TRANSFORMERS, COILS AND FILTERS

Mark	Part No.	Symbol & Description
ATC-192	L201	FM ANT coil
ATC-193	L202	FM ANT coil
ATC-195	L204	FM OSC coil
ATH-049	L2, L203, L205	RF choke coil
ATH-050	L1	RF choke coil
ATC-194	T201	FM RF coil
ATE-045	T1	FM DET coil
ATB-087	T101	AM ANT coil
ATB-073	T102	AM OSC coil
ATE-063	T202	FM IF transformer
ATF-141	F4, F5	Lowpass filter
ATF-109	F1, F2	FM ceramic filter

Mark	Part No.	Symbol & Description
ATF-131	F3	Beat eliminate filter
ATF-140	F6	AM ceramic filter

## CAPACITORS

Mark	Part No.	Symbol & Description
ACM-015	TC101, TC102	Ceramic trimmer
ACG-023	C33	Ceramic
ACH-367	C322	Electrolytic
CKPYX 103N 25	C334	
CQSA 431J 50	C109	
CEA 222M 6L	C332	
CEA 471M 25L	C320	
CKDYF 103Z 50	C110, C126, C133, C203, C207, C211~C214, C218, C302, C305, C329, C341, C318, C328, C340	
CKDYF 223Z 50	C1, C2, C4~C7, C15, C20, C21, C101, C102, C104, C106, C107, C120, C121, C125, C127, C132, C134, C308, C325, C327, C333, C342	
CKDYF 473Z 50	C9~C11, C19, C14, C22, C137, C324, C339	
CKDYX 473M 25	C310, C317, C319	
CKDYB 102K 50	C131, C136	
CCDSL 020C 50	C206	
CCDSL 030C 50	C210, C221	
CCDSL 050C 50	C208	
CCDCH 080D 50	C103	
CCDCH 150J 50	C108, C215, C335	
CCDCH 100D 50	C217	
CCDTH 180J 50	C219	
CCDCH 180J 50	C336	
CCDCH 330J 50	C216	
CCDCH 470J 50	C138	
CCDRH 390J 50	C201, C202, C204, C205	
CCDSL 101J 50	C17, C209	
QOMA 683J 50	C130	
CCDSL 181J 50	C12, C13, C326	
QOMA 222J 50	C24, C25	
CEA R22M 50L	C331	
CEA R47M 50L	C30	
CEA 010M 50L	C31, C35, C119, C301, C37, C306, C337, C338	
CEA 1R5M 50L	C303, C316, C323	
CEA 2R2M 50L	C28, C29, C38	
CEA 3R3M 50L	C123	
CEA 4R7M 50L	C18, C26, C27, C122, C307, C316, C323	
CEA 6R8M 50L	C32	
CEA 330M 16L	C105, C124, C135, C34, C330, C343	
CEA 101M 25L	C16, C304	
CEA 221M 16L	C8, C23, C321	
VR1	Semifixed	
VR2, VR3	Semifixed	

Mark	Part No.	Symbol & Description
RD%PM821J	R378	
RN%PO1802F	R38	
RN%PQ3301F	R21	
RS1LF151J	R343	
ACN-142	R339, R340	Resister array
RD1/8PM□□J	Other resistors	

Mark	Part No.	Symbol & Description
AKA-017	Terminal (ANTENNA)	
AKB-093	Terminal (OUTPUT)	
PBZ30P060FMC	Screw (3x6)	
★ ASS-025	X1	Crystal resonator
★ AAV-017		Flourescent display tube

## LED Assembly

## SEMICONDUCTORS

Mark	Part No.	Symbols & Description
★ AEL-388	D403, D405~D412	LED (Red)
★ AEL-383	D404	LED (Green)

## SWITCH

Mark	Part No.	Symbols & Description
★★ ASG-703	S3, S4, S6~S15	Tact switch

## RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbols & Description
RD 1/8 PM □□ J	R4	

Mark	Part No.	Symbol & Description
ATF-131	F3	Beat eliminate filter
ATF-140	F6	AM ceramic filter

#### CAPACITORS

Mark	Part No.	Symbol & Description
ACM-015	TC101, TC102	Ceramic trimmer
ACG-023	C33	Ceramic
ACH-367	C322	Electrolytic
CKPYX 103N 25	C334	
CQSA 431J 50	C109	

CEA 222M 6L

CEA 471M 25L

CKDYF 103Z 50

CKDYF 223Z 50

CKDYF 473Z 50

CKDYX 473M 25

CKDYB 102K 50

CCDSL 020C 50

CCDSL 030C 50

CCDSL 050C 50

CCDCH 080D 50

CCDCH 150J 50

CCDCH 100D 50

CCDTH 180J 50

CCDCH 180J 50

CCDCH 330J 50

CCDCH 470J 50

CCDRH 390J 50

CCDSL 101J 50

CQMA 683J 50

CCDSL 181J 50

CQMA 222J50

CEA R22M 50L

CEA R47M 50L

CEA 010M 50L

CEA 1R5M 50L

CEA 2R2M 50L

CEA 3R3M 50L

CEA 4R7M 50L

CEA 6R8M 50L

CEA 330M 16L

CEA 101M 25L

CEA 221M 16L

#### RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
★ RHB8AVS203-T	VR1	Semifixed
★ RHB8AVS103-T	VR2, VR3	Semifixed

Mark	Part No.	Symbol & Description
	RD1/4PM821J	R378
⚠	RN1/4PQ1802F	R38
	RN1/4PQ3301F	R21
	RS1LF151J	R343
	ACN-142	R339, R340 Resister array
	RD1/8PM□□J	Other resistors

#### OTHERS

Mark	Part No.	Symbol & Description
	AKA-017	Terminal (ANTENNA)
	AKB-093	Terminal (OUTPUT)
	PBZ30P060FMC	Screw (3x6)
★	ASS-025	X1 Crystal resonator
★	AAV-017	Flourescent display tube

#### LED Assembly

#### SEMICONDUCTORS

Mark	Part No.	Symbol & Description
★	AEL-388	D403, D405~D412 LED (Red)
★	AEL-383	D404 LED (Green)

#### SWITCH

Mark	Part No.	Symbol & Description
★★	ASG-703	S3, S4, S6~S15 Tact switch

#### RESISTORS

NOTE: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

Mark	Part No.	Symbol & Description
	RD 1/8 PM □□J	R403 ~ R406

#### LED Ass'y S

#### SEMICONDUCTOR.

Mark	Part No.	Symbol & Description
★	AEL-383	D401 LED (Green)

#### RESISTORS

Mark	Part No.	Symbol & Description
	RD 1/8 PM 151J	R401
	RD 1/4 PM 681J	R402

#### Power Switch Assembly

#### SWITCH

Mark	Part No.	Symbol & Description
★★	ASG-413	S1 Push switch

#### Switch Assembly 1

#### SWITCH

Mark	Part No.	Symbol & Description
★★	ASH-028	S16 Slide switch (AM CHANNEL STEP)

## 9. ADJUSTMENTS

#### FM Tuner Section

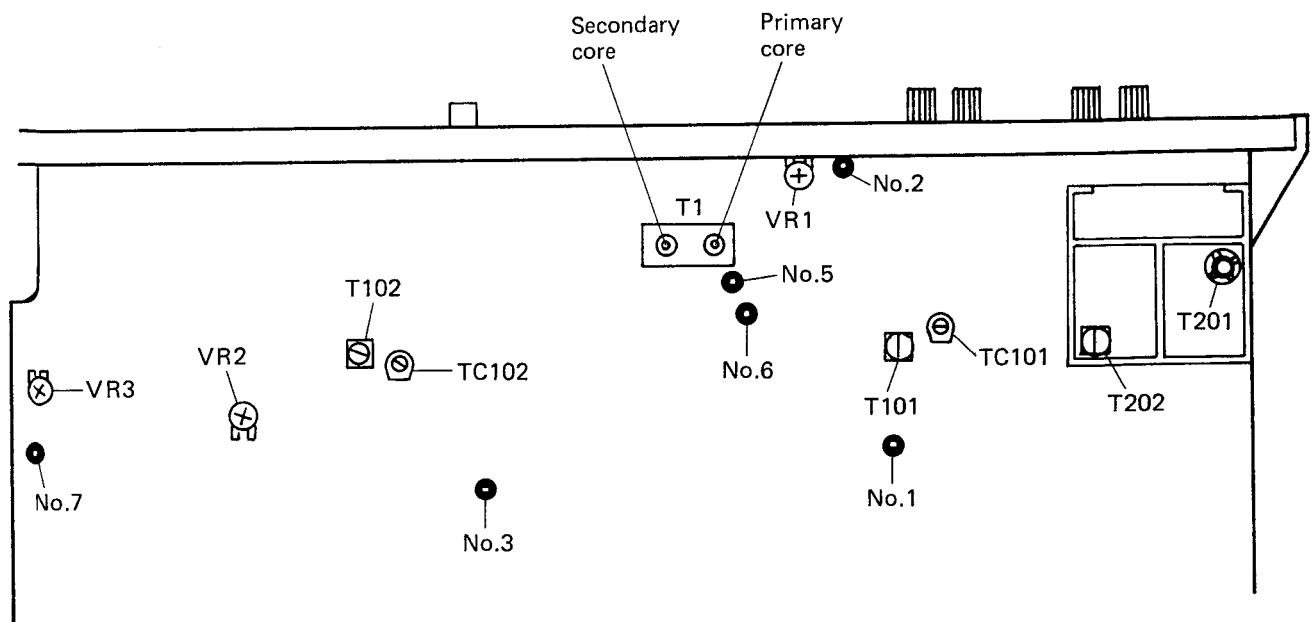
- Connect the FM signal generator (FM SG) to the FM ANTENNA 300Ω terminal through a 300Ω dummy antenna.
- Set the TX-940 to the FM band and MANUAL tuning mode.
- Set the FM MUTING switch to the OFF position.
- (\*) Tune the FM SG to the TX-940.
- (\*) Connect the FM multiplex stereo signal generator to the FM SG external modulator terminal. Set the modulation to Main 1kHz/L +R/±67.5kHz deviation, Pilot 19kHz/±7.5kHz deviation.

Step	FM SG (400Hz, ±75kHz deviation)		TX-940 Frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			
1	98.0MHz(*1)	20dB	98.0MHz	T201, T202	Adjust until DC voltage between terminal no.2 and ground is maximum.
2	98.0MHz(*1)	66dB	98.0MHz	T1 (primary core)	Adjust DC voltage between terminal no.5 and no.6 to 0V (within ±3mV).
3	98.0MHz(*1)	86dB	98.0MHz	T1 (secondary core)	Minimize the distortion of the OUTPUT terminal signal.
4	Repeat steps 2 and 3 until both requirements are satisfied.				
5	Set the FM MUTING switch to the ON position.				
6	98.0MHz(*1) not modulation	86dB	98.0MHz	VR3	Adjust signal between terminal no.7 and ground to 76kHz (within ±76Hz).
7	98.0MHz(*1) Stereo modulation(*2) (Main=1kHz, L or R)	86dB	98.0MHz	VR2	Adjust so that separation at OUTPUT terminal is balanced between R and L channels and maximized at the same time.
8	98.0MHz(*1) Stereo modulation(*2)	86dB	98.0MHz	T202 (within ±90°)	Adjust until distortion at OUTPUT L or R terminal is minimum.
9	98.0MHz(*1)	36dB	98.0MHz	VR1	Adjust just before muting is effected.

#### AM Tuner Section

- Connect the furnished AM loop antenna between terminals AM ANTENNA and GND.
- Connect the AM signal generator (AM SG) to the AM ANTENNA terminal through a 10kΩ resistor.
- Set the TX-940 to the AM (MW) band and MANUAL tuning mode.
- Set the AM CHANNEL STEP switch to the 9kHz position (KU, S and S/G types).
- (\*) Tune the AM SG to the TX-940.

Step	AM SG (400Hz, 30% modulation)		TX-940 Frequency display	Adjustment point	Adjustment procedure
	Frequency	Level			



## 9. RÉGLAGE

### Section accordeur MF

- Brancher le générateur de signal MF (FM SG) sur la borne de 300 Ohms de l'antenne MF au moyen d'une antenne fictive de 300 Ohms.
- Régler le TX-940 sur la bande MF et sur le mode d'accord manuel.

- Déplacer le sélecteur de réglage silencieux FM (FM MUTING) sur la position OFF.

(\*1) Accorder le FM SG sur le TX-940.

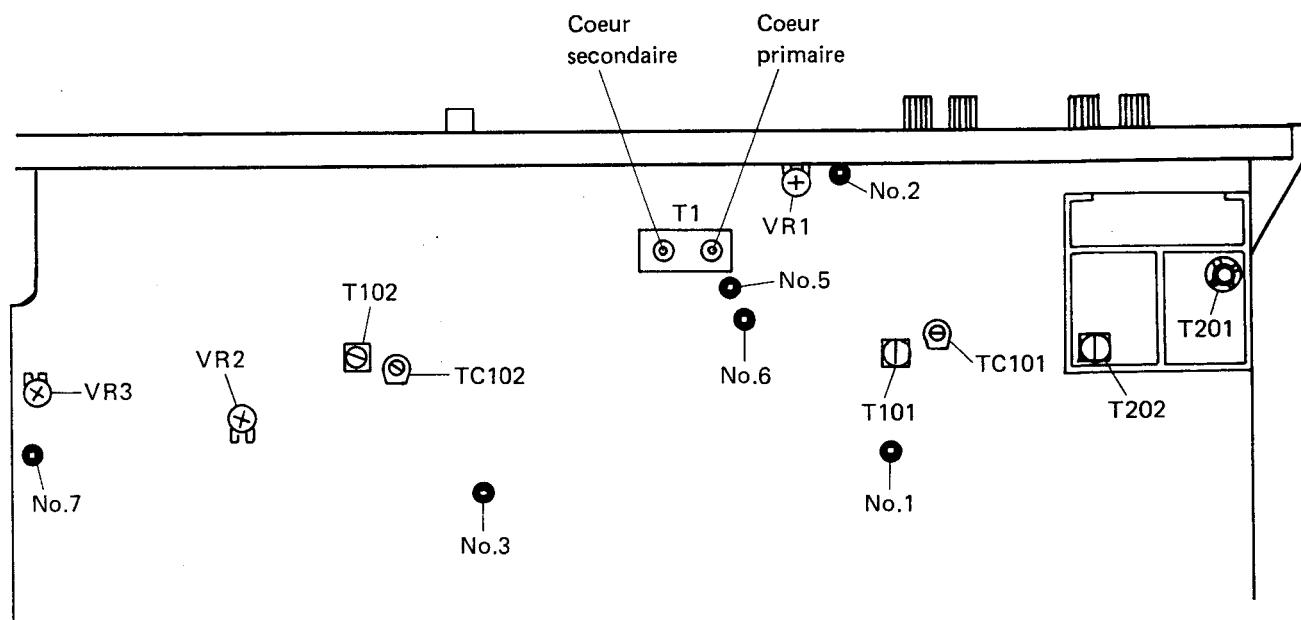
(\*2) Brancher le générateur de signal stéréo multiplex MF sur la borne de modulation externe du FM SG. Régler la modulation du conducteur principal à une déviation de 1kHz/L+R/±67,5kHz, le pilote à une déviation de 19kHz/±7,5kHz.

Phase	FM SG (déviation de 400Hz, ±75kHz)		TX-940 Affichage de fréquence	Point de réglage	Méthode de réglage
	Fréquence	Niveau			
1	98,0MHz (*1)	20dB	98,0MHz	T201,T202	Régler jusqu'à ce que la tension CC entre la borne n° 2 et la masse soit au maximum.
2	98,0MHz (*1)	66dB	98,0MHz	T1 (coeur primaire)	Régler jusqu'à ce que la tension CC entre les borne n° 5 et n° 6 au 0V (±3mV).
3	98,0MHz (*1)	86dB	98,0MHz	T1 (coeur secondaire)	Régler au minimum la distortion du signal de la borne de sortie (OUTPUT)
4	Répéter les phase 2 et 3 jusqu'à ce que les spécifications soient correctes.				
5	Déplacer le sélecteur de réglage silencieux FM (FM MUTING) sur la position ON.				
6	98,0MHz (*1) pas de modulation	86dB	98,0MHz	VR3	Régler le signal à 76kHz (±400Hz) entre la borne n° 7 et la masse.
7	98,0MHz (*1) (Modulation stéréo (*2) (Principal=1kHz gauche ou droite)	86dB	98,0MHz	VR2	Procéder au réglage afin qu'au niveau de la borne de sortie (OUTPUT) la séparation soit répartie d'une façon optimale entre les canaux droit et gauche.
8	98,0MHz (*1) Modulation stéréo (*2)	86dB	98,0MHz	T202 (Entre ±90°)	Régler jusqu'à ce que la distorsion aux bornes de sortie gauche et droite soit au minimum.
9	98,0MHz (*1)	36dB	98,0MHz	VR1	Procéder au réglage juste avant d'enclencher le commutateur de silence (MUTING).

### Section accordeur MA

- Brancher l'antenne bouclée MA fournie entre les bornes d'antenne MA et la masse.
- Brancher le générateur de signal MA (AM SG) sur la borne d'antenne MA à travers une résistance de 10 kOhms.
- Réglér le TX-940 sur la bande MA (Ondes moyennes) et sur le mode d'accord manuel.
- Positionner le commutateur de canaux AM sur la position de 9kHz (type KU, S et S/G).
- (\*3) Accorder le AM SG sur le TX-940.

Phase	AM SG (Modulation 400Hz, 30%)		TX-940 Affichage de fréquence	Point de réglage	Méthode de réglage
	Fréquence	Niveau			
1	Pas de signal		522kHz	T102	1,2V CC entre la borne n° 1 et la masse.
2	Pas de signal		1611kHz	TC102	10V CC entre la borne n° 1 et la masse.
3	Répéter les phase 1 et 2 jusqu'à ce que les spécifications soient correctes.				
4	603kHz (*3)	76dB	603kHz	T101	Régler jusqu'à ce que la tension CC entre la borne n° 3 et la masse soit au maximum.
5	1395kHz (*3)	76dB	1395kHz	TC101	
6	Répéter les phase 4 et 5 jusqu'à ce que soit atteint le maximum de sensibilité.				



## 9. AJUSTE

### Sección del sintonizador de FM

- Conectar el generador de señales de FM (FM SG) al terminal FM ANTENNA 300Ω a través de una antena ficticia de 300Ω.
- Ajustar el TX-940 a la banda de AM (MW) y al modo de sintonización MANUAL.
- Poner el interruptor de silenciamiento en FM (FM MUTING) en la posición OFF.

(\*1) Sintonizar el FM SG con el TX-940.

(\*2) Conectar el generador de señales estereofónicas de multiplex de FM al terminal de modulación exterior del FM SG.

Ajustar la modulación a Principal 1kHz/L+R/±67,5kHz de desviación y Piloto 19kHz/±7,5kHz de desviación.

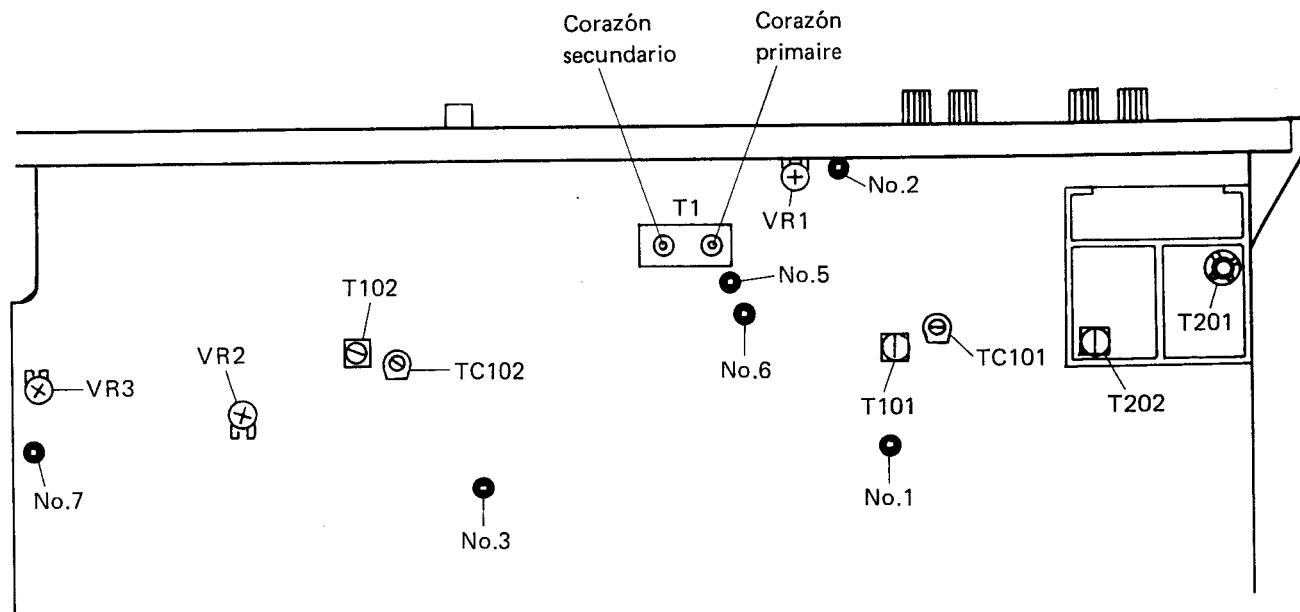
Paso	FM SG (400Hz, desviación de ±75kHz)		Frecuencímetro del TX-940	Puntos de ajuste	Procedimientos de ajuste
	Frecuencia	Nivel			
1	98,0MHz (*1)	20dB	98,0MHz	T201,T202	Ajustar hasta que la tensión de CC entre el terminal no. 2 y masa sea la máxima.
2	98,0MHz (*1)	66dB	98,0MHz	T1 (corazón primario)	Ajustar hasta que la tensión de CC entre los terminales no. 5 no. 6 a 0V (dentro de ±3mV).
3	98,0MHz (*1)	86dB	98,0MHz	T1 (corazón secundario)	Minimizar la distorsión de la señal del terminal de salida (OUTPUT).
4	Repetir los pasos 2 y 3 hasta que ambas especificaciones sean correctas.				
5	Poner el interruptor de silenciamiento en FM (MF MUTING) en la posición ON.				
6	98,0MHz (*1)	86dB Sin modulación	98,0MHz	VR3	Ajustar la señal entre el terminal no. 7 y masa a 76kHz (±400Hz).
7	98,0MHz (*1) Modulación estereofónica (*1) (Principal=1kHz, izq. o der.)	86dB	98,0MHz	VR2	Ajustar de modo que la separación en el terminal OUTPUT esté equilibrada entre los terminales R y L y sea al mismo tiempo la máxima.
8	98,0MHz (*1) Modulación estereofónica (*2)	86dB	98,0MHz	T202 (Dentro de ±90°)	Ajustar hasta que la distorsión en el terminal OUTPUT R o L sea la mínima.
9	98,0MHz (*1)	36dB	98,0MHz	VR1	Ajustar precisamente antes de que se afecte el silenciamiento.

### Sección del sintonizador de AM

- Conectar la antena de cuadro de AM suministrada entre los terminales AM ANTENNA y GND.
- Conectar el generador de señales de AM (AM SG) al terminal AM ANTENNA a través de un resistor de  $10k\Omega$ .
- Ajustar el TX-940 a la banda de AM (MW) y al modo de sintonización MANUAL.
- Ajustar el selector de paso del canal de AM (AM CHANNEL STEP) en la posición de 9kHz (tipos KU, S y S/G).

(\*3) Sintonizar el AM SG con el TX-940.

Paso	AM SG (400Hz, 30% de modulación)		Frecuencí- metro del TX-940	Puntos de ajuste	Procedimientos de ajuste
	Frecuencia	Nivel			
1	Sin señal		522kHz	T102	1,2V CC entre el terminal no. 1 y masa.
2	Sin señal		1611kHz	TC102	10V CC entre el terminal no. 1 y masa.
3	Repetir los pasos 1 y 2 hasta que ambas especificaciones sean correctas.				
4	603kHz (*3)	76dB	603kHz	T101	Ajustar hasta que la tensión de CC entre el terminal no. 3 y masa sea la máxima.
5	1395kHz (*3)	76dB	1395kHz	TC101	
6	Repetir los pasos 4 y 5 hasta lograrse la máxima sensibilidad.				



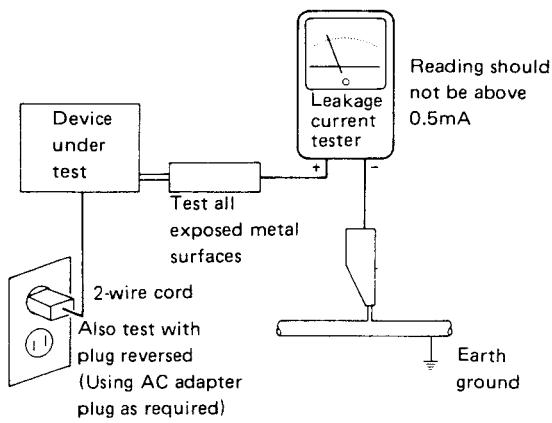
## 10. SAFETY INFORMATION

### 1. SAFETY PRECAUTIONS

The following check should be performed for the continued protection of the customer and service technician.

#### LEAKAGE CURRENT CHECK

Measure leakage current to a known earth ground (water pipe, conduit, etc.) by connecting a leakage current tester such as Simpson Model 229-2 or equivalent between the earth ground and all exposed metal parts of the appliance (input/output terminals, screwheads, metal overlays, control shaft, etc.). Plug the AC line cord of the appliance directly into a 120V AC 60Hz outlet and turn the AC power switch on. Any current measured must not exceed 0.5mA.



AC Leakage Test

ANY MEASUREMENTS NOT WITHIN THE LIMITS OUTLINED ABOVE ARE INDICATIVE OF A POTENTIAL SHOCK HAZARD AND MUST BE CORRECTED BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

### 2. PRODUCT SAFETY NOTICE

Many electrical and mechanical parts in the appliance have special safety related characteristics. These are often not evident from visual inspection nor the protection afforded by them necessarily can be obtained by using replacement components rated for voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this Service Manual.

Electrical components having such features are identified by marking with a  on the schematics and on the parts list in this Service Manual.

The use of a substitute replacement component which does not have the same safety characteristics as the PIONEER recommended replacement one, shown in the parts list in this Service Manual, may create shock, fire, or other hazards.

Product Safety is continuously under review and new instructions are issued from time to time. For the latest information, always consult the current PIONEER Service Manual. A subscription to, or additional copies of, PIONEER Service Manual may be obtained at a nominal charge from PIONEER.

## 11. FOR HE AND YP TYPES

The HE and YP types are the same as the KU type with the exception of the following section.

### Contrast of Miscellaneous Parts

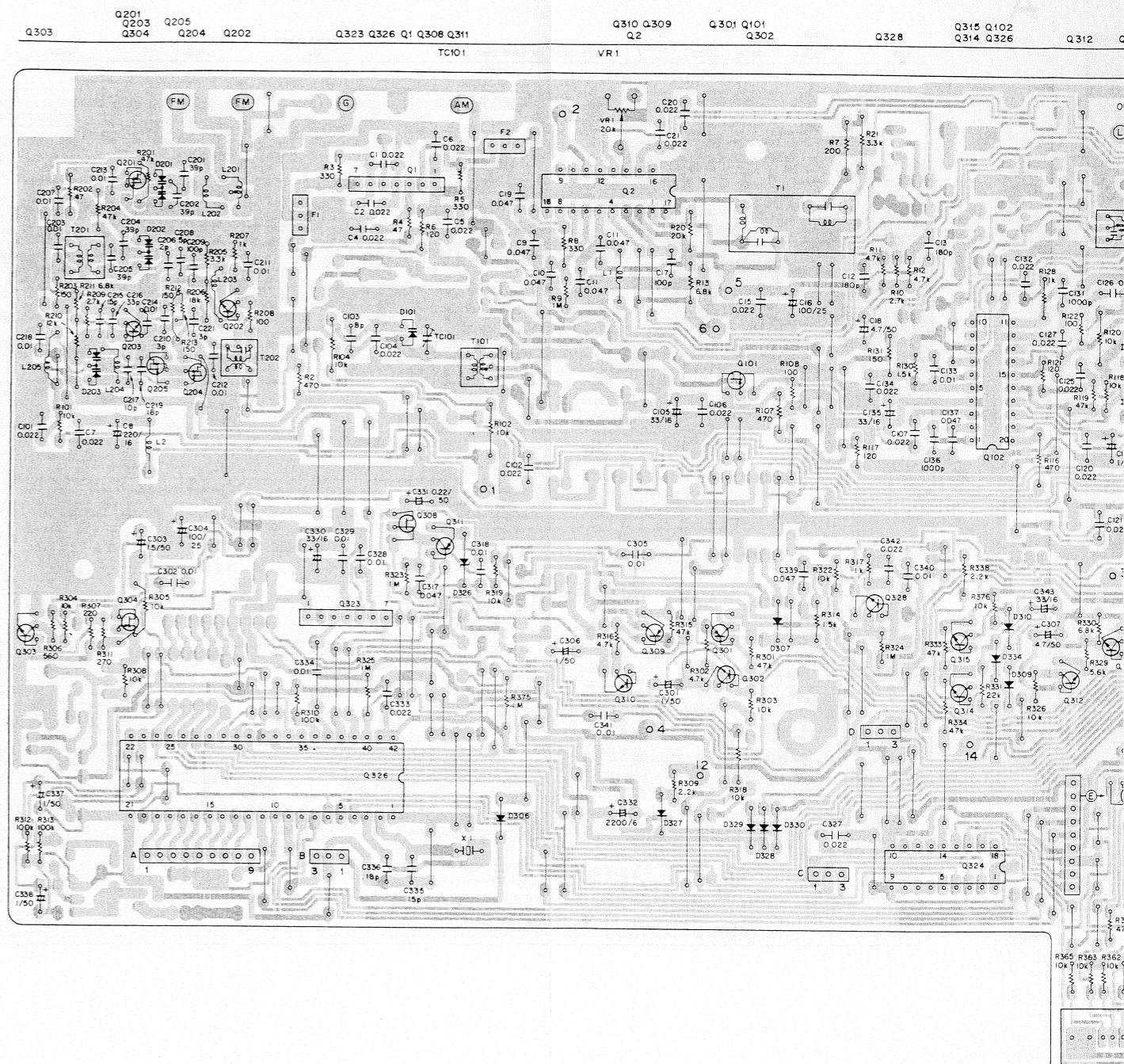
Mark	Symbol & Description	Part No.			Remarks
		KU type	HE type	YP type	
	Complex ass'y	GWM-291	GWM-292	GWM-292	
	Switch ass'y 1	non supply	.....	.....	
★ ★	FU1	Fuse (T250mA)	.....	AEK-037	AEK-037
★	T2	Power transformer (120V) (220V, 240V)	ATT-997	.....	.....
	AC power cord	ADG-073	ADG-071	ADG-064	
	R377 (2.2M, 1/2 W)	ACN-029	.....	.....	
	Operating instructions (English)	ARB-558	.....	ARB-558	
	(English, French, German, Italian)	.....	ARE-075	.....	
	Packing case	AHE-198	AHE-199	AHE-201	

### Complex Ass'y (GWM-292)

The complex ass'y GWM-292 (for HE and YP types) is the same as the GWM-291 (for KU type) with the exception of following sections.

Mark	Symbol & Description	Part No.		Remark
		GWM-291	GWM-292	
★ ★	Terminal (ANTENNA) Q307	AKA-017 .....	AKA-018 2SC2458 (2SC2603)	
	C24, C25	CQMA 222J 50	CQMA 152J 50	

A



B

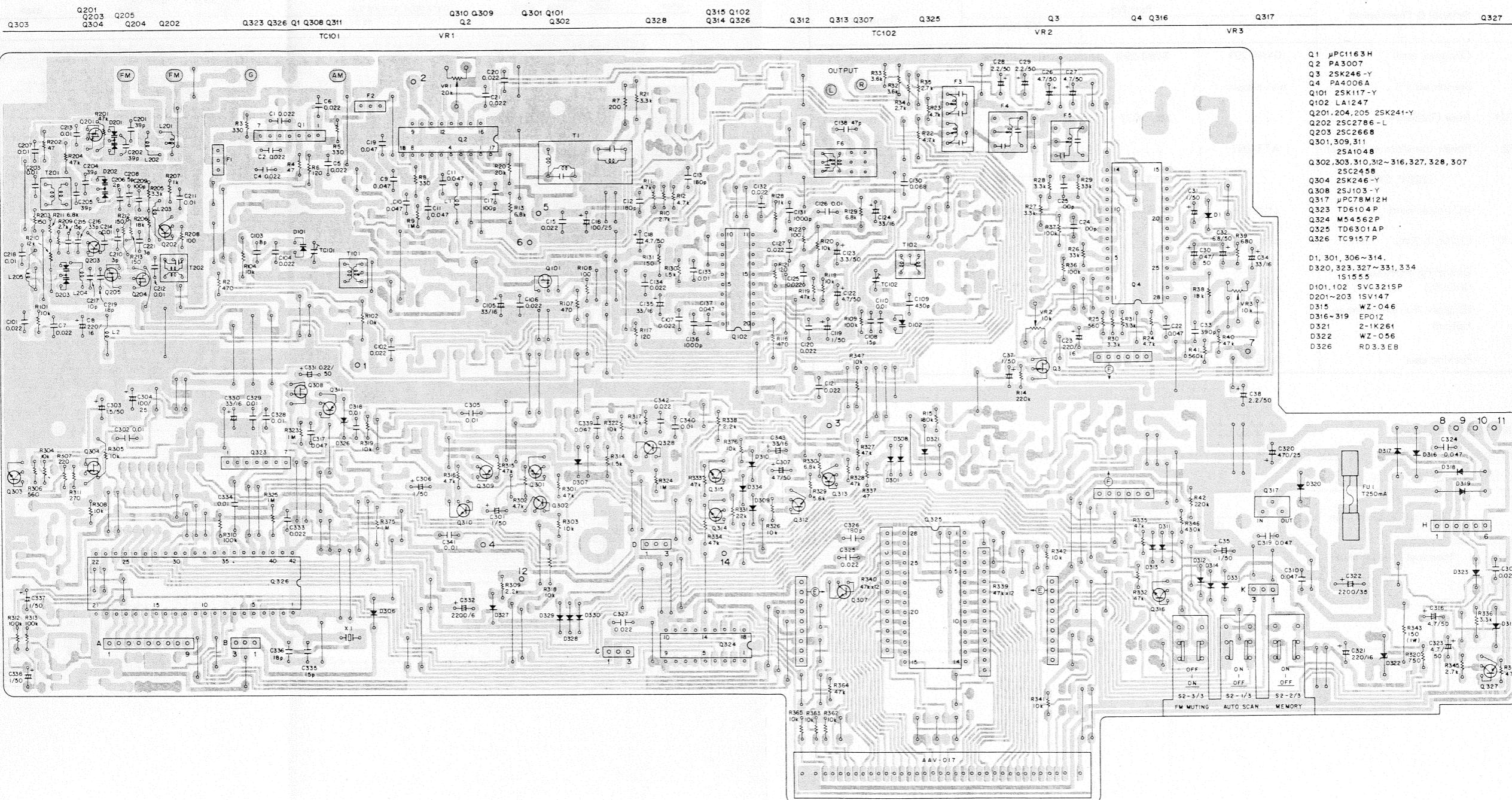
C

D

### Complex Ass'y (GWM-292)

A

A



KS

B

B

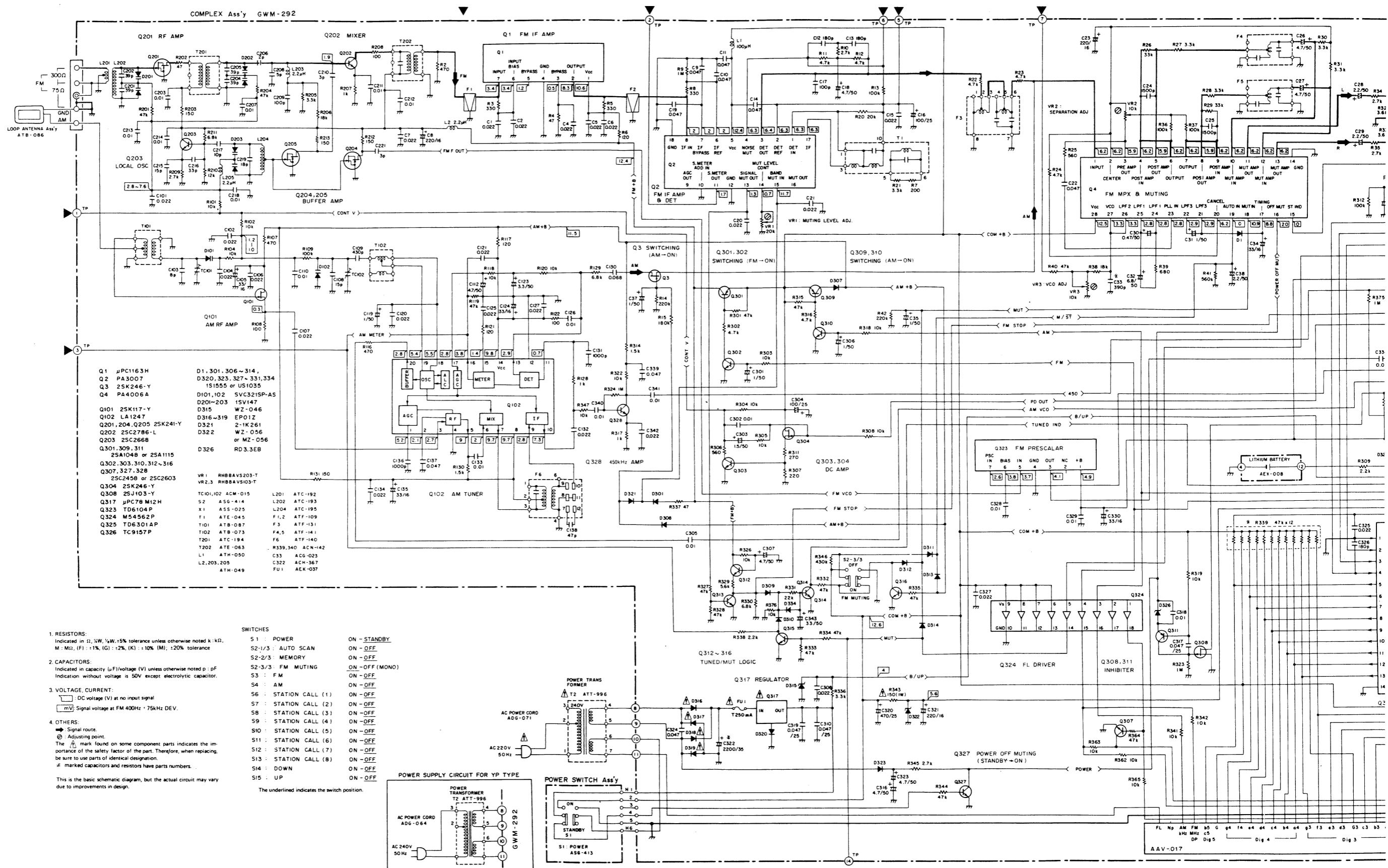
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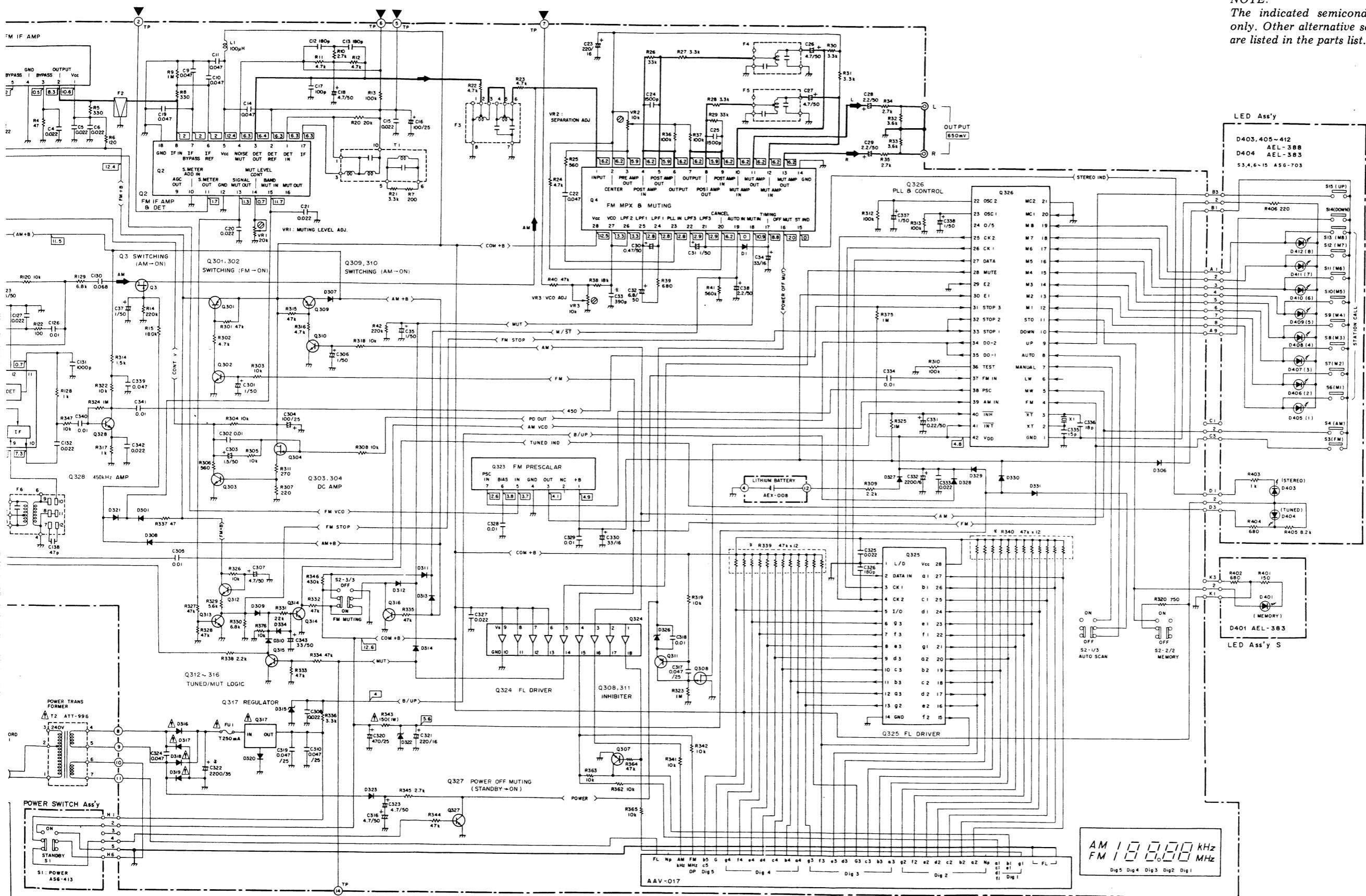
C

6

D

## SCHEMATIC DIAGRAM (FOR HE AND YP TYPES)





A

B

C

D

## 12. FOR SS TYPE

The SS type is the same as the KU type with the exception of the following sections.

### Contrast of Miscellaneous Parts

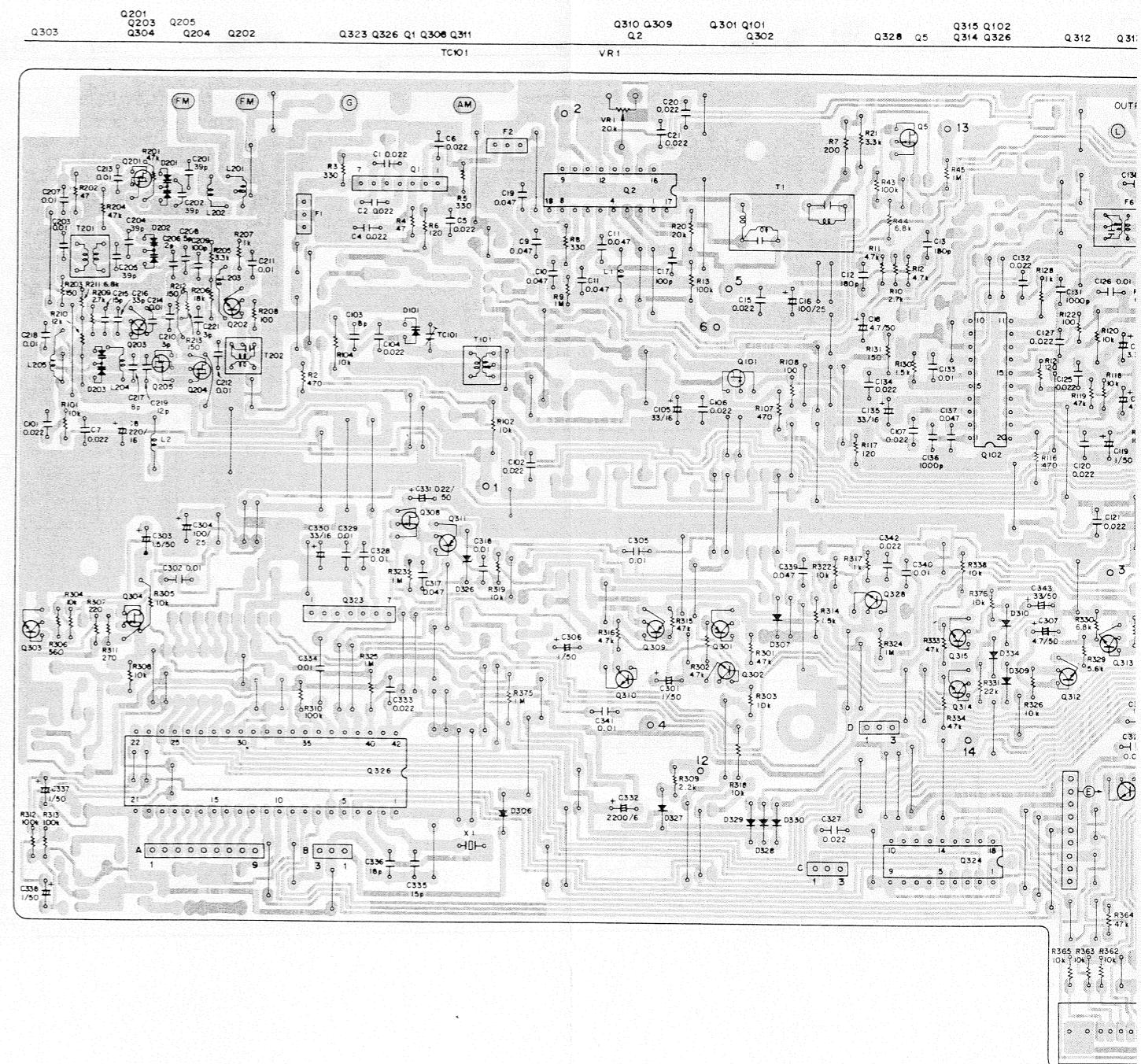
Mark	Symbol & Description	Part No.		Remark
		KU type	SS type	
	Complex ass'y	GWM-291	GWM-294	
	Switch ass'y 1	non supply	.....	
★ ★	FU1 Fuse (250mA)	.....	AEK-037	
★	T2 Power transformer (120V) (110V, 120V, 220V, 240V)	ATT-997	.....	
	AC power cord	ADG-073	ADG-072	
	S17 Line voltage selector	.....	AKX-502	
	R377 (2.2M, 1/2W)	ACN-029	.....	
	Screw (3x10)	.....	MTZ30P100FZK	for line voltage selector
	Packing case	AHE-198	AHE-201	

### Complex Ass'y (GWM-294)

The complex ass'y GWM-294 (for SS type) is the same as the GWM-291 (for KU type) with the exception of following sections.

Mark	Symbol & Description	Part No.		Remark
		GWM-291	GWM-294	
★ ★	Q307	.....	2SC2458 (2SC2603)	
★ ★	Q5	.....	2SJ103-Y	
L204	FM OSC coil	ATC-195	ATC-196	
C217		CCDCH 100D 50	CCDCH 080D 50	
C219		CCDTH 180J 50	CCDTH 150J 50	
C24, C25		CQMA 222J 50	CQMA 152J 50	

A



C

D

1

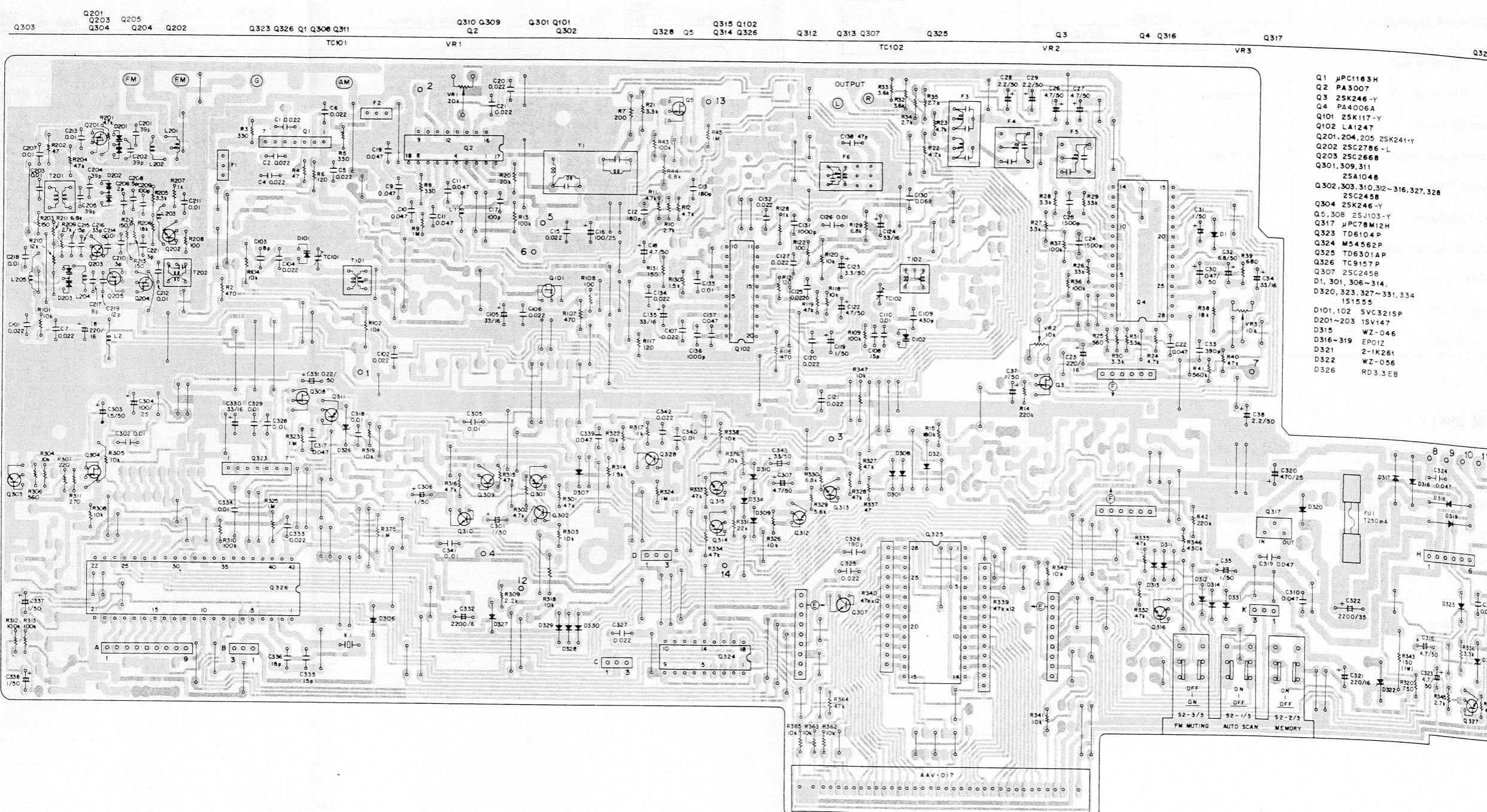
2

3

4

5

A



selector

B

A

B

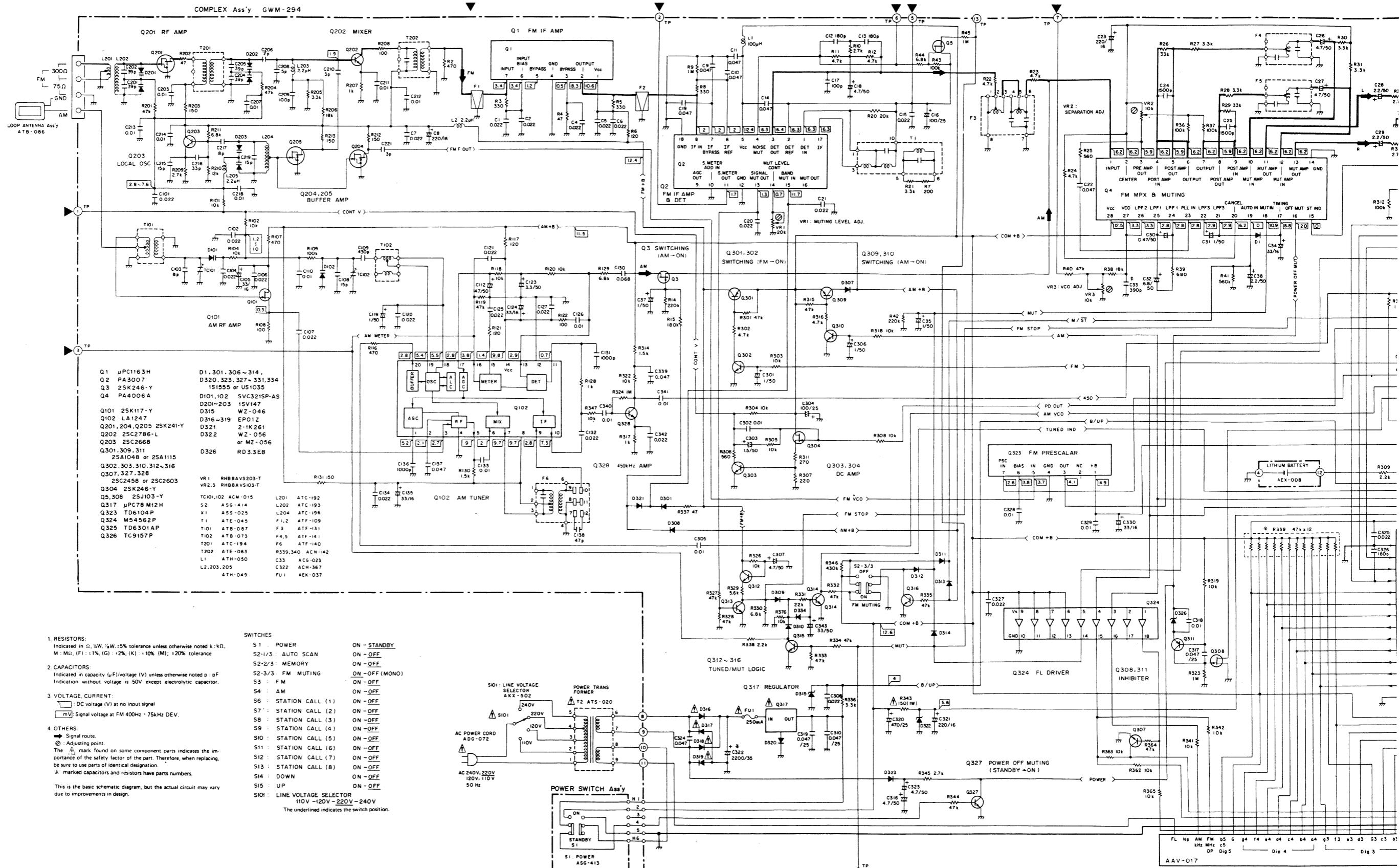
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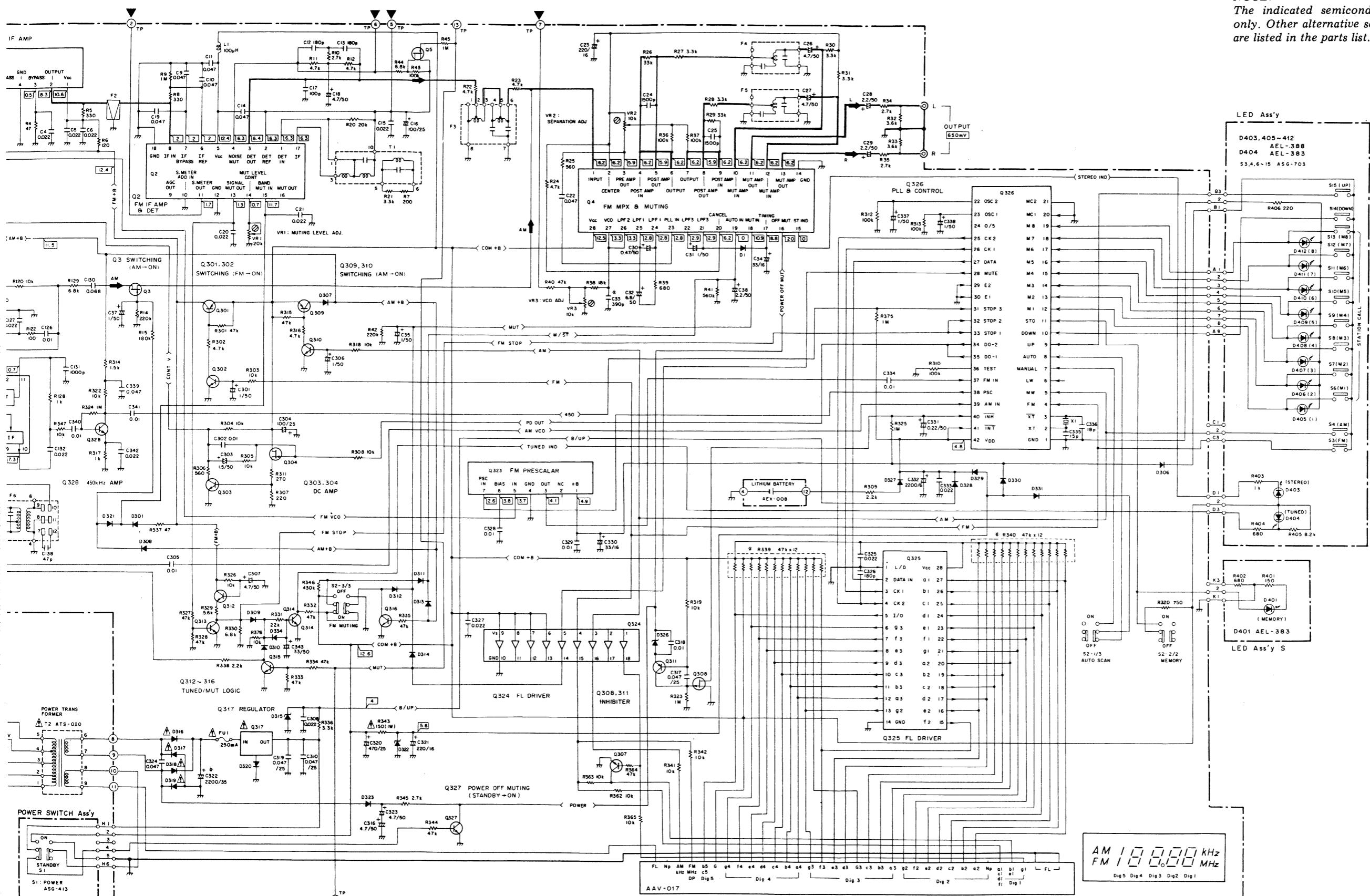
C

D

D

## SCHEMATIC DIAGRAM (FOR SS TYPE)





A

B

C

D

## 13. FOR S AND S/G TYPES

The S and S/G types are the same as the KU type with the exception of the following sections.

### Contrast of Miscellaneous Parts

Mark	Symbol & Description	Part No.			Remarks
		KU type	S type	S/G type	
	Complex ass'y	GWM-291	GWM-296	GWM-296	
	Switch ass'y 2	.....	non supply	non supply	(DE-EMPHASIS)
S101	Line voltage selector	.....	AKX-502	AKX-502	
★ T2	Power transformer (120V) (110V, 120V, 220V, 240V)	ATT-997	.....	.....	
	AC power cord	ADG-073	ADG-072	ADG-072	
R377	(2.2M, 1/2W)	ACN-029	.....	.....	
	Screw (3x10)	.....	MTZ30P100FZK	MTZ30P100FZK	for line voltage selector
	Operating instructions (English) (Spanish)	ARB-558	ARB-558	ARB-558	
	Packing case	ARB-048	.....	.....	
		AHE-198	AHE-201	AHE-201	

### Complex Ass'y (GWM-296)

The complex ass'y GWM-296 (for S and S/G types) is the same as the GWM-291 (for KU type) with the exception of following sections.

Mark	Symbol & Description	Part No.		Remark
		GWM-291	GWM-296	
Q307		.....	2SC2458 (2SC2603)	
D315		WZ-046	RD4.7EB (HZ4.7EB)	
D322		WZ-056 (MZ-056)	RD5.6EB (HZ5.6EB)	
C24, C25		CQMA 222J 50	CQMA 152J 50	
C343		.....	CEA 330M 16L	

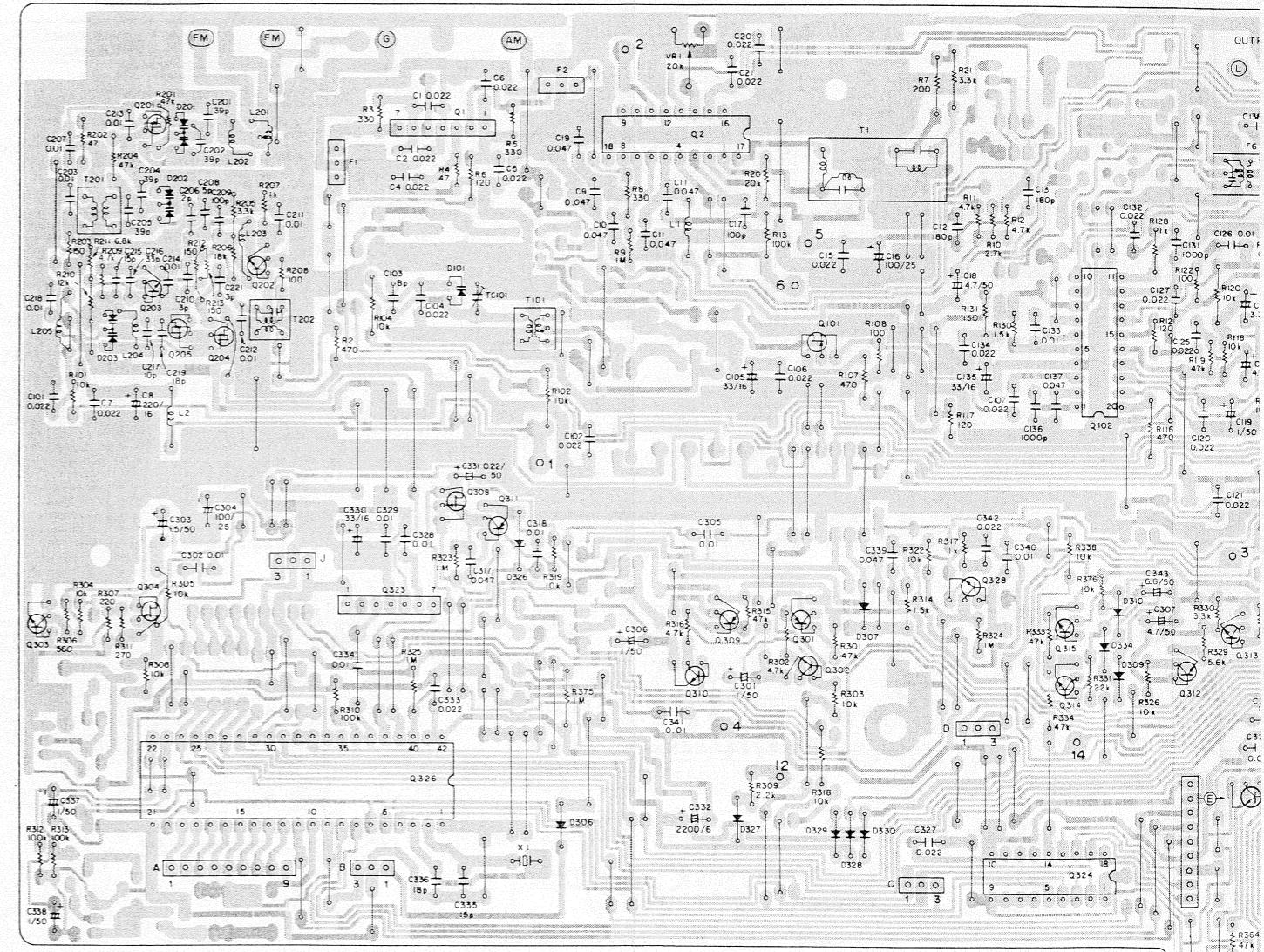
### Switch Ass'y 2

Mark	Part No.	Symbol & Description
ASH-028	S17	Slide switch (DE-EMPHASIS)

A

### Complex Ass'y (GWM-296)

Q201 Q203 Q205 Q206 Q202  
Q303 Q304 Q304 Q204 Q202  
Q323 Q326 Q1 Q308 Q311  
TC101 VR1  
Q310 Q309 Q2  
Q301 Q101 Q302  
Q328 Q315 Q102  
Q314 Q326  
Q312 Q31

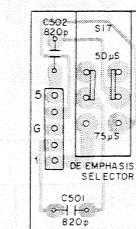


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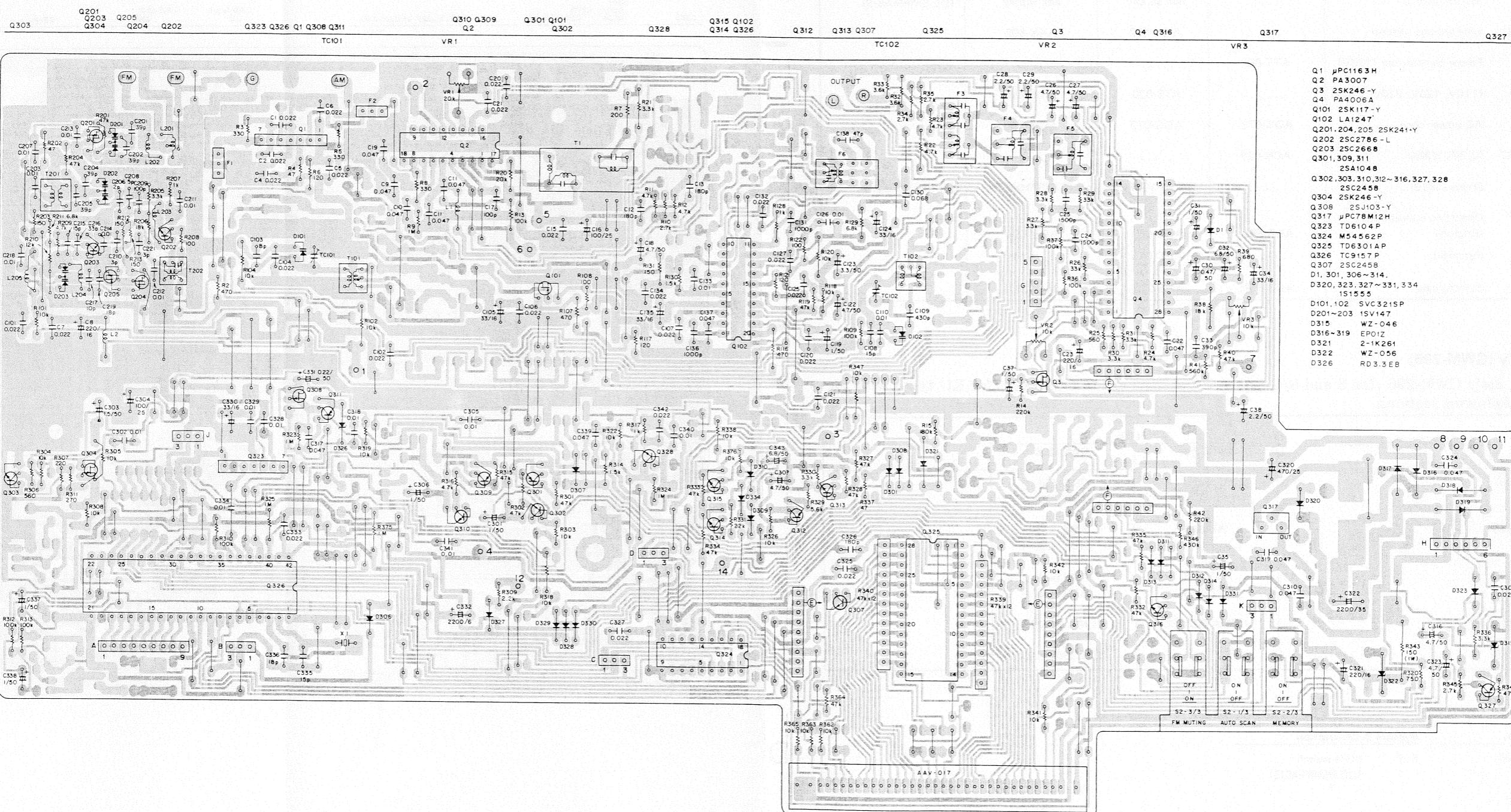
Switch Ass'y 2



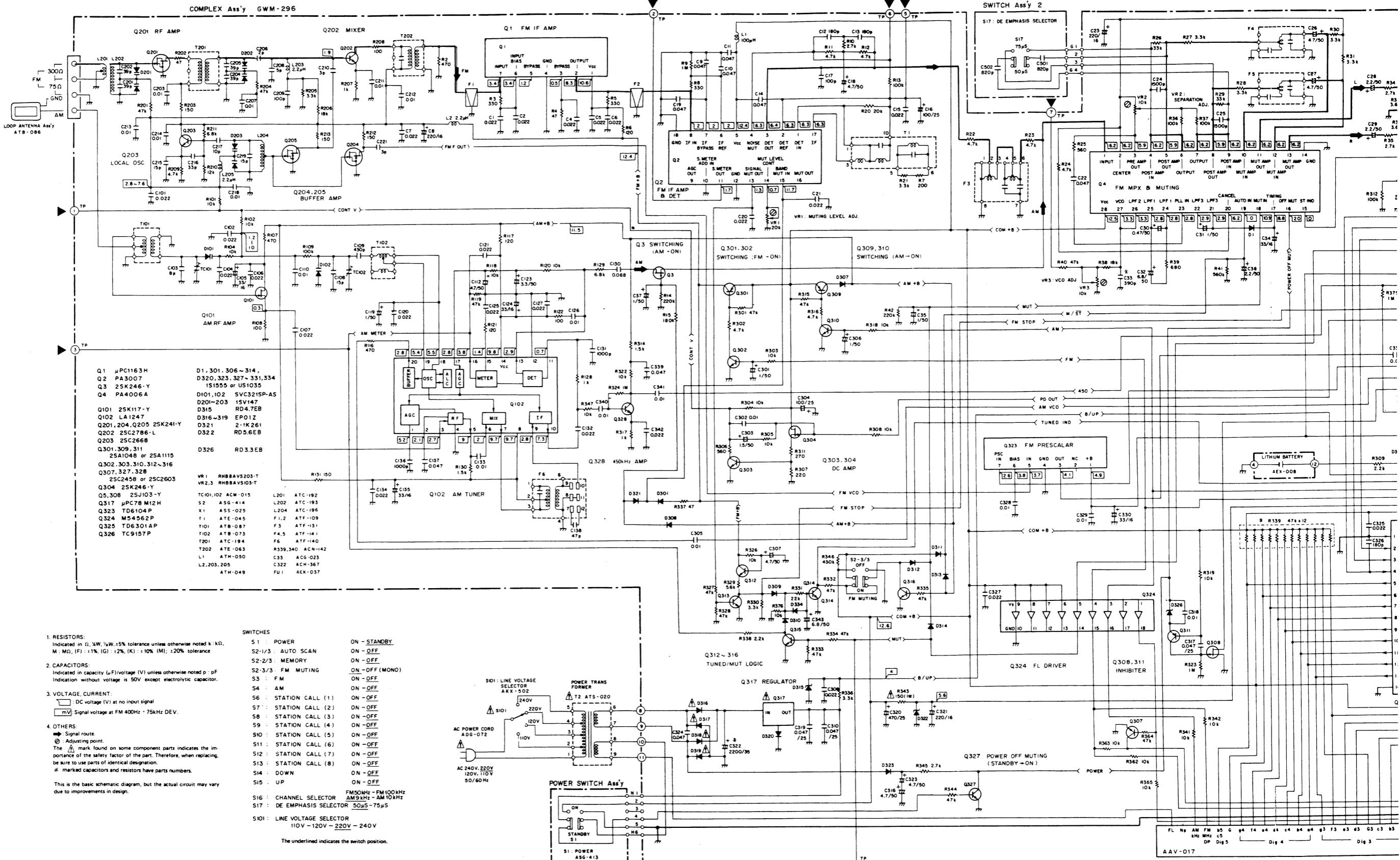
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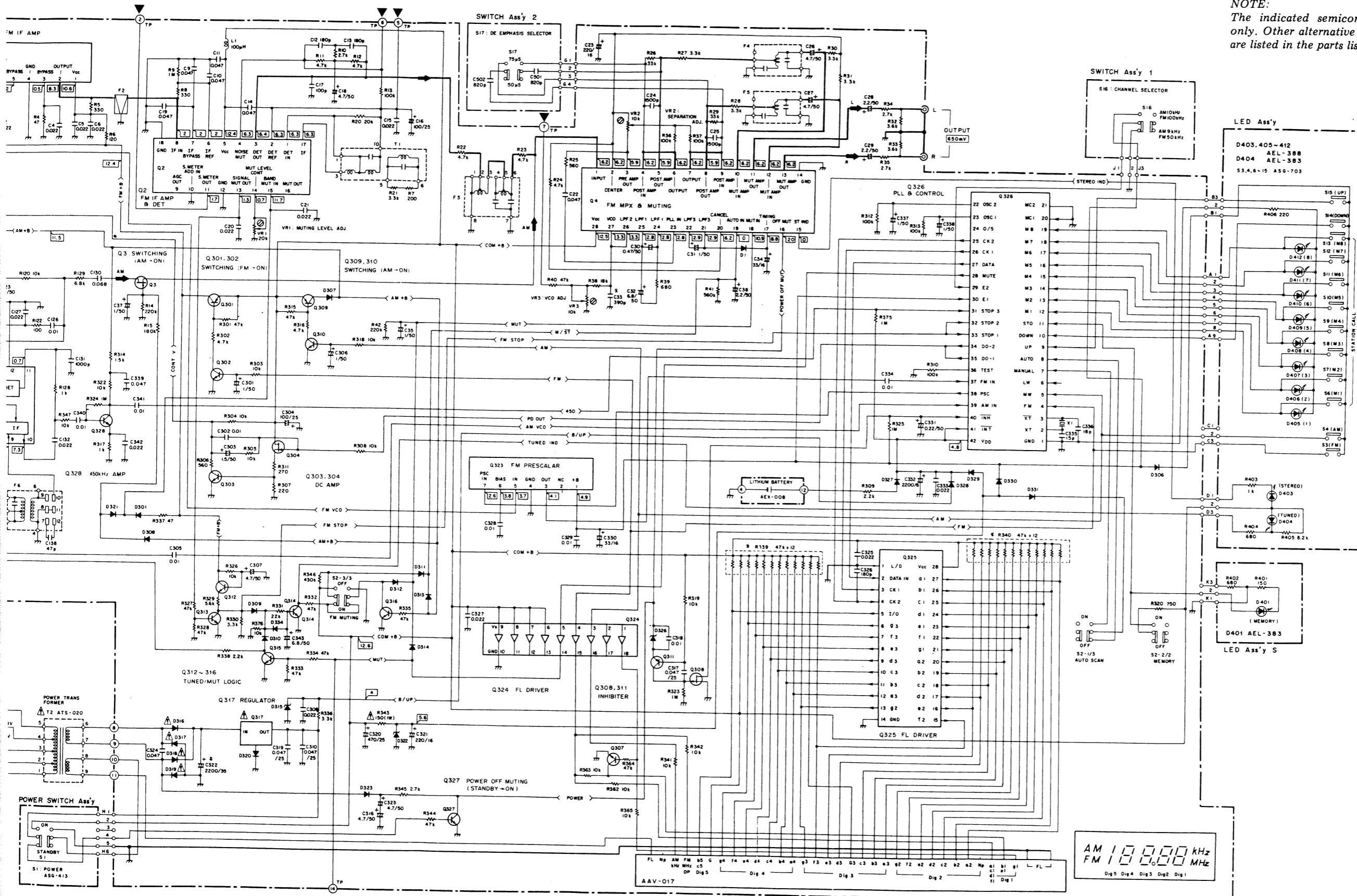
A

Complex Ass'y (GWM-296)



## SCHEMATIC DIAGRAM (FOR S AND S/G TYPES)





A

B

C

D

**PIONEER**

# Service Manual

## CIRCUIT DESCRIPTIONS



The photo shows the model TX-940.

ORDER NO.  
ARP-353-0

STEREO TUNER

**TX-540 F-50**

FM/AM DIGITAL SYNTHESIZED TUNER

**TX-940 F-70**

- This service manual is made based on the KU, KC types. It can be applied to other types except for minor points.

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**PIONEER ELECTRONIC CORPORATION** 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan

**PIONEER ELECTRONICS (USA) INC.** 1925 E. Dominguez St., Long Beach, California 90810 U.S.A.

**PIONEER ELECTRONIC (EUROPE) N.V.** Keetberglaan 1, 2740 Beveren, Belgium

**PIONEER ELECTRONICS AUSTRALIA PTY. LTD.** 178-184 Boundary Road, Braeside, Victoria 3195, Australia

FL © MAY 1983 Printed in Japan

# 1. TX-540 AND F-50 CIRCUIT DESCRIPTIONS

## 1.1 IC OUTLINE

### TA7640AP Pin Functions

Pin	Standard voltage (V)		Pin name	I/O	Function and operation
	FM	AM			
1	0	1.5	AM MIX IN	Input	AM mixer input
2	0	1.5	AM MIX BYPASS	Input	Connection to AM mixer bias capacitor. Connecting this pin to ground inhibits mixer operation, and switches the pin no.9 output to an FM detector output.
3	2.3	2.3	AM OSC		Connection to AM local oscillator tuning circuit.
4	2.3	2.3	Reg	Output	Constant voltage (2.3V) output pin.
5	0.9	1.0	AM IF OUT	Input/output	AM IF amplifier output and AM detector input.
6	0.9	1.0	Meter OUT	Input/output	Signal meter output and signal indicator driver input.
7	—	—	LED	Output	Signal indicator output. L level active.
8	0	0	GND		GND.
9	1.5	1.4	DET OUT	Output	Output pin: FM output when pin no.2 is 0V. AM output when pin no.2 is 1.5V.
10	6.3	6.3	Vcc		Power supply voltage pin.
11	6.3	6.3	FM DET		Connection to FM quadrature detector tuning circuit.
12	1.5	1.5	AM IF BYPASS		Connection to AM IF amplifier bypass capacitor.
13	1.5	1.5	AM IF IN	Input	AM IF amplifier input pin.
14	1.5	1.5	FM IF BYPASS		Connection to FM IF amplifier bypass capacitor.
15	1.5	1.5	FM IF IN	Input	FM IF amplifier input pin.
16	6.3	6.3	AM MIX OUT	Output	AM mixer output pin.

### $\mu$ PC1235C Pin Functions

Pin	Pin name	I/O	Function and operation
1	Vcc		Power supply voltage pin.
2	PRE AMP IN	Input	Preamplifier input pin.
3	PRE AMP OUT	Output	Preamplifier output pin.
4	POST AMP BIAS (Lch)		Left channel post amplifier bias pin and NF input pin.
5	POST AMP BIAS (Rch)	Input	Right channel post amplifier bias pin and NF input pin.
6	Rch OUT		Right channel post amplifier output pin.
7	Lch OUT	Output	Left channel post amplifier output pin.
8	GND		GND
9	ST IND and 19kHz	Output	Stereo indicator output pin and 19kHz check output pin.
10	PILOT FILTER		Connection to pilot detector circuit L.P.F.
11	PILOT FILTER		
12	PILOT IN	Input	Pilot signal input pin.
13	LOOP FILTER		Connection to PLL L.P.F.
14	LOOP FILTER		
15	VCO CR		Connection to VCO capacitance/resistance.
16	AUTO/MONO	Input	Up to 1.4V : Stereo operation. Between 1.6 and 5V : VCO generation in mono mode. Above 7V : VCO generation stopped in mono mode.

## BA695 Pin Functions

Pin	Pin name	I/O	Function and operation	Level Active
1	REF	Input	FM S-curve center voltage input pin. Connected to ground during AM mode.	
2	SC IN	Input	FM S-curve input pin.	
3	S IN	Input	Signal meter level input pin.	
4	CR		Connection to capacitance/resistance for setting the L1/L3 output blinking frequency. Connect to ground if L1/L3 output blinking not required.	
5	GND		GND.	
6	L 3	Output	S-curve negative region indicator output. This output appears if the output from pin no.3 exceeds 0.5V and the voltage at pin no.2 is at least 90mV less than the voltage at pin no.1. If pin no.1 is connected to ground, however, there is no output. If resistance/capacitance is connected to pin no.4, the output blinks on and off at the frequency set by that circuit. See Figure 1-1.	
7	L 2	Output	S-curve central region indicator and AM mode signal indicator output. This output appears if the output from pin no.3 exceeds 0.5V and the voltage at pin no.2 is at least 90mV less than the voltage at pin no.1. The output is also obtained if an input of at least 0.5V is applied to pin no.3 when pin no.1 is grounded. See Figures 1-1 and 1-2.	
8	L 1	Output	S-curve positive region indicator output. This output appears when the output from pin no.3 is at least 0.5V, and the voltage at pin no.2 is at least 90mV greater than the voltage at pin no.1. There is no output, however, if pin no.1 is connected to ground. If resistance/capacitance is connected to pin no.4, the output blinks on and off at the frequency set by that circuit. See Figure 1-1.	
9	Vcc		Positive power supply voltage pin.	

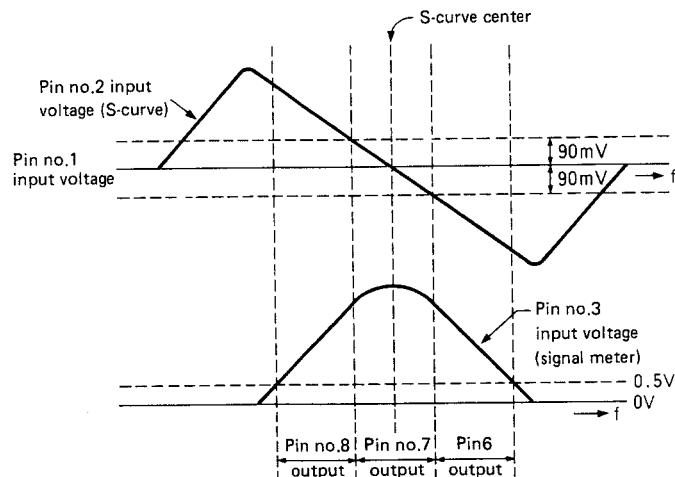


Fig. 1-1 FM mode operation

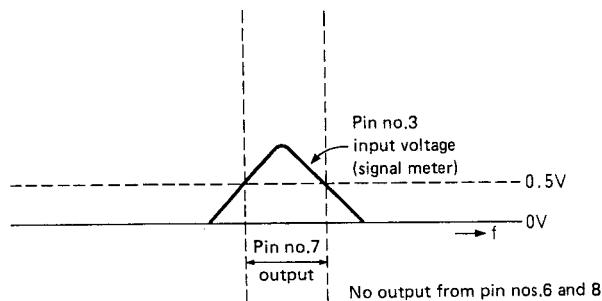
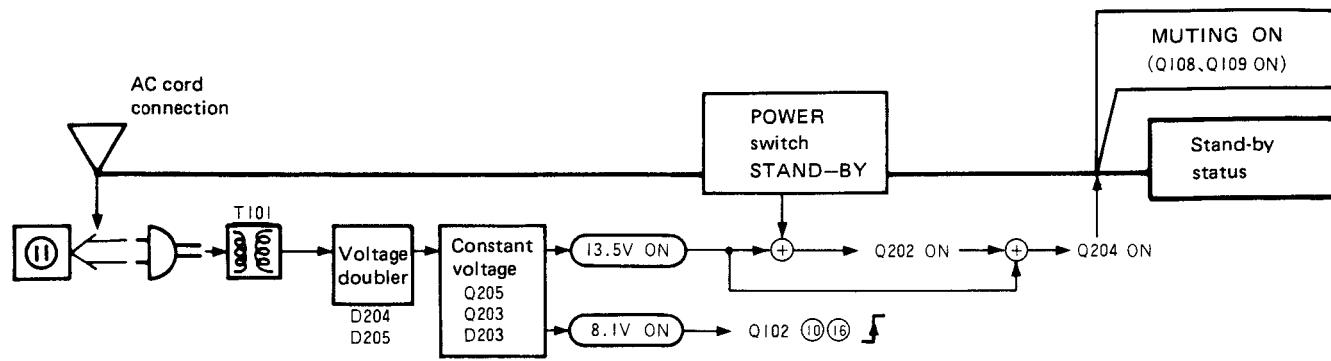


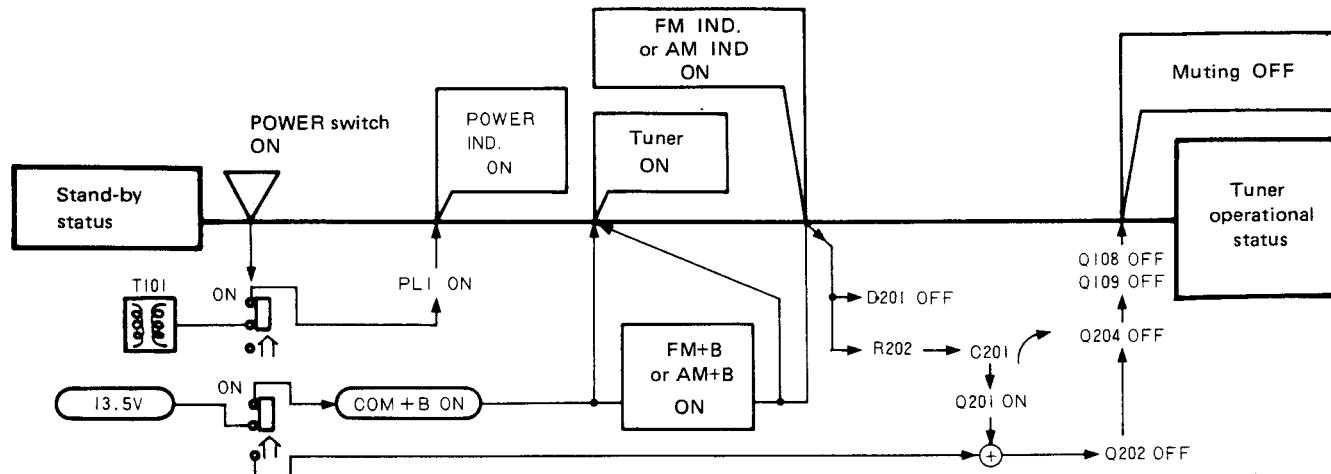
Fig. 1-2 AM mode operation

## 1.2 OPERATION FLOWCHARTS (See block diagram on page 8)

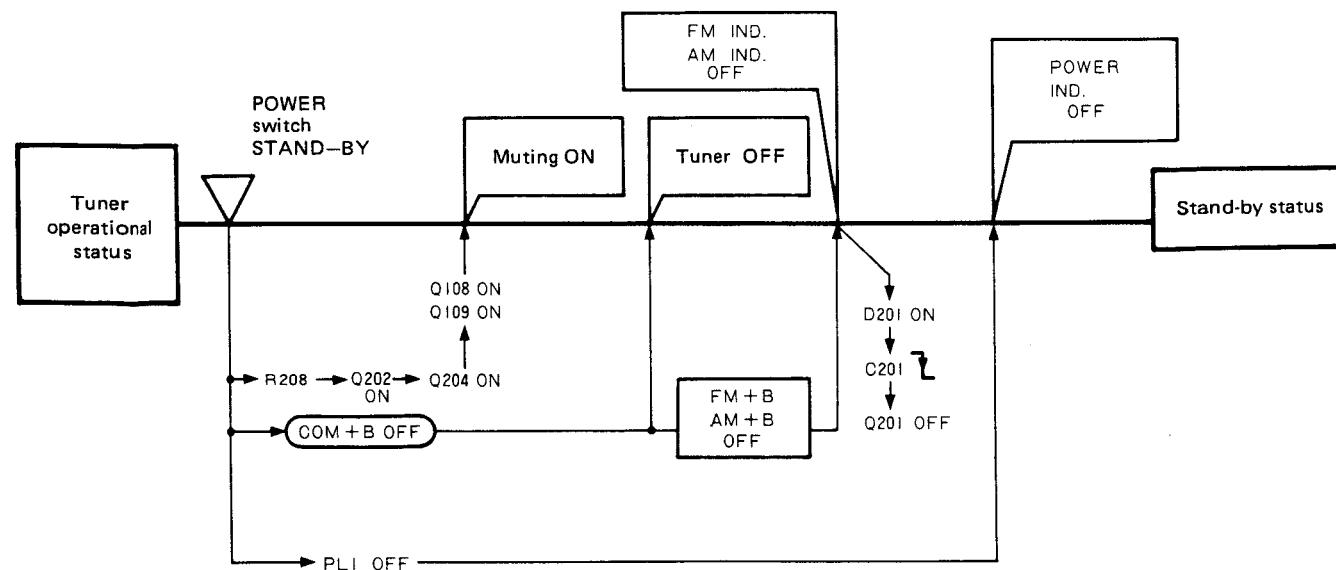
## AC Cord Connection



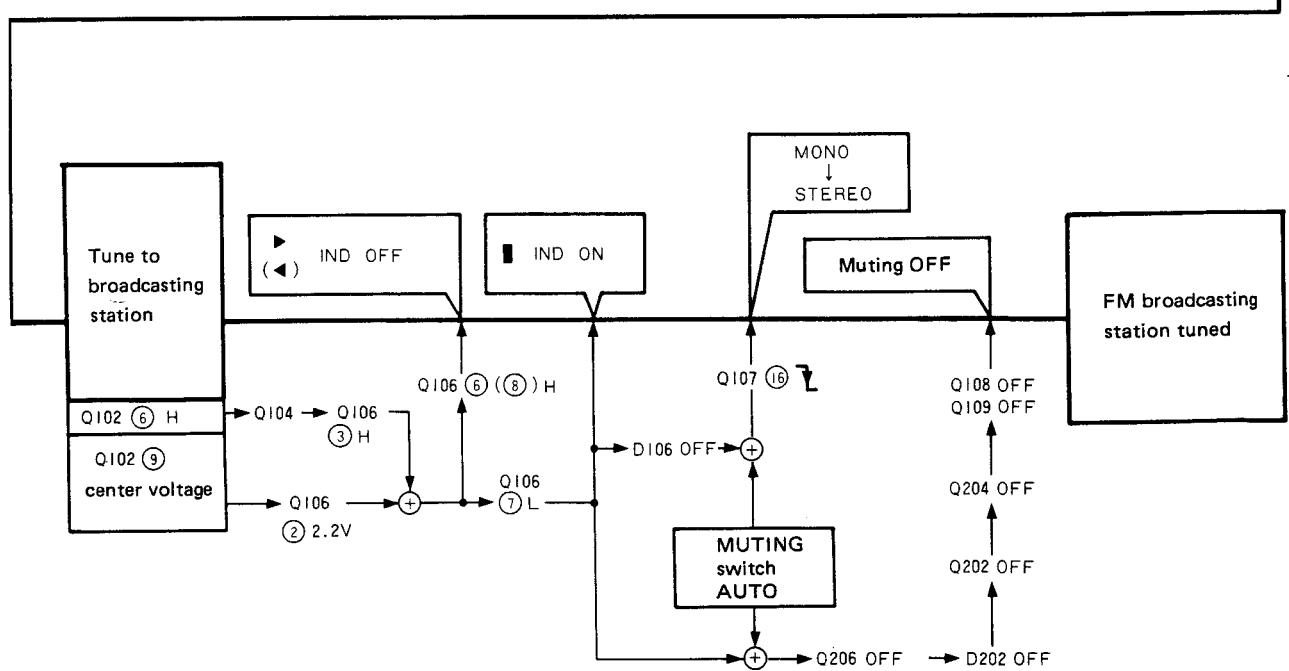
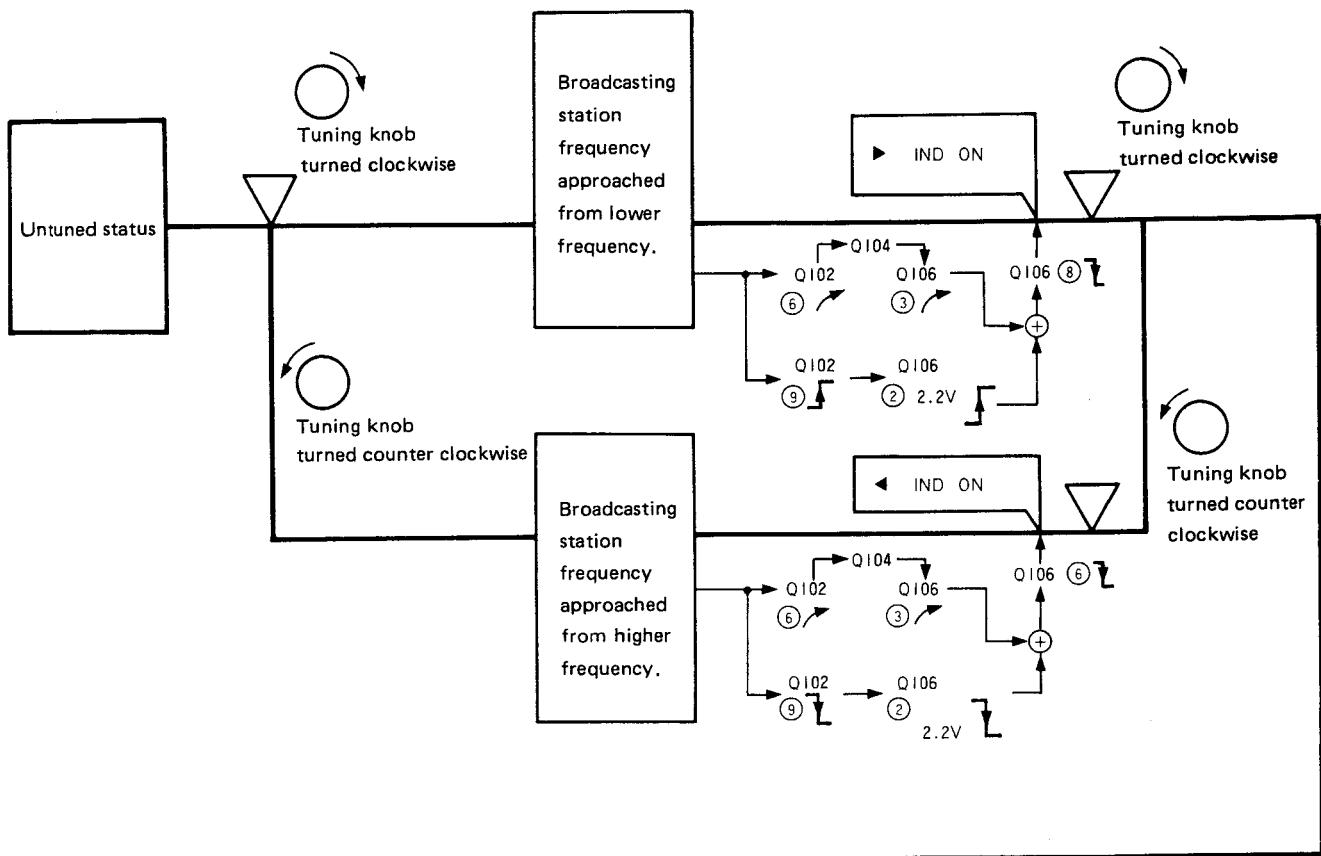
## POWER STAND-BY → ON



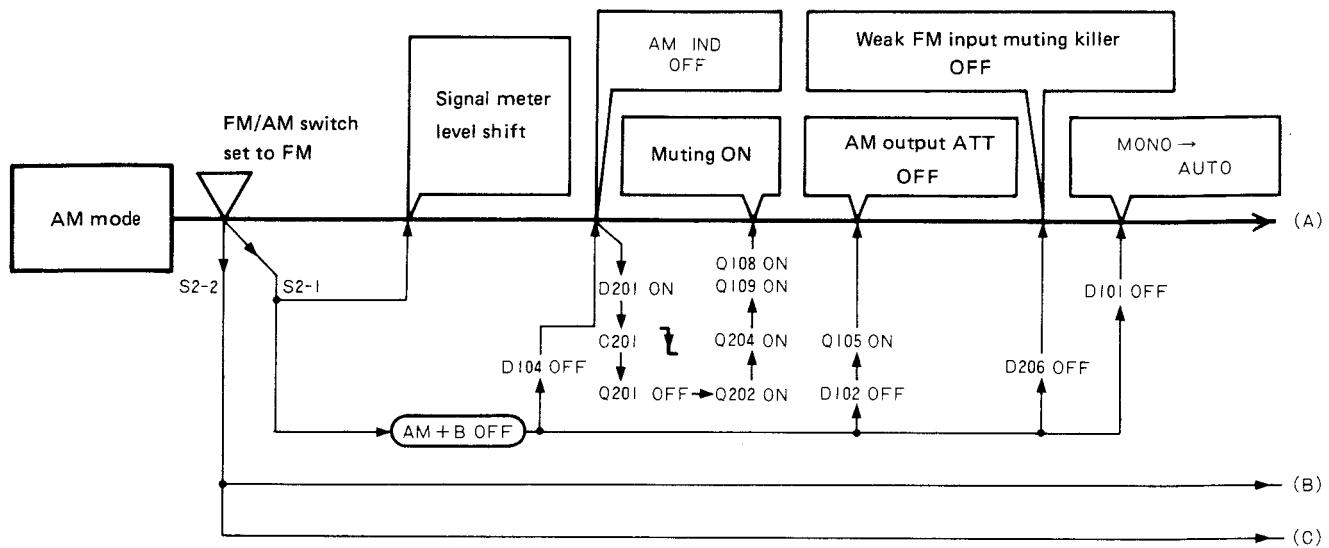
## POWER ON → STAND-BY



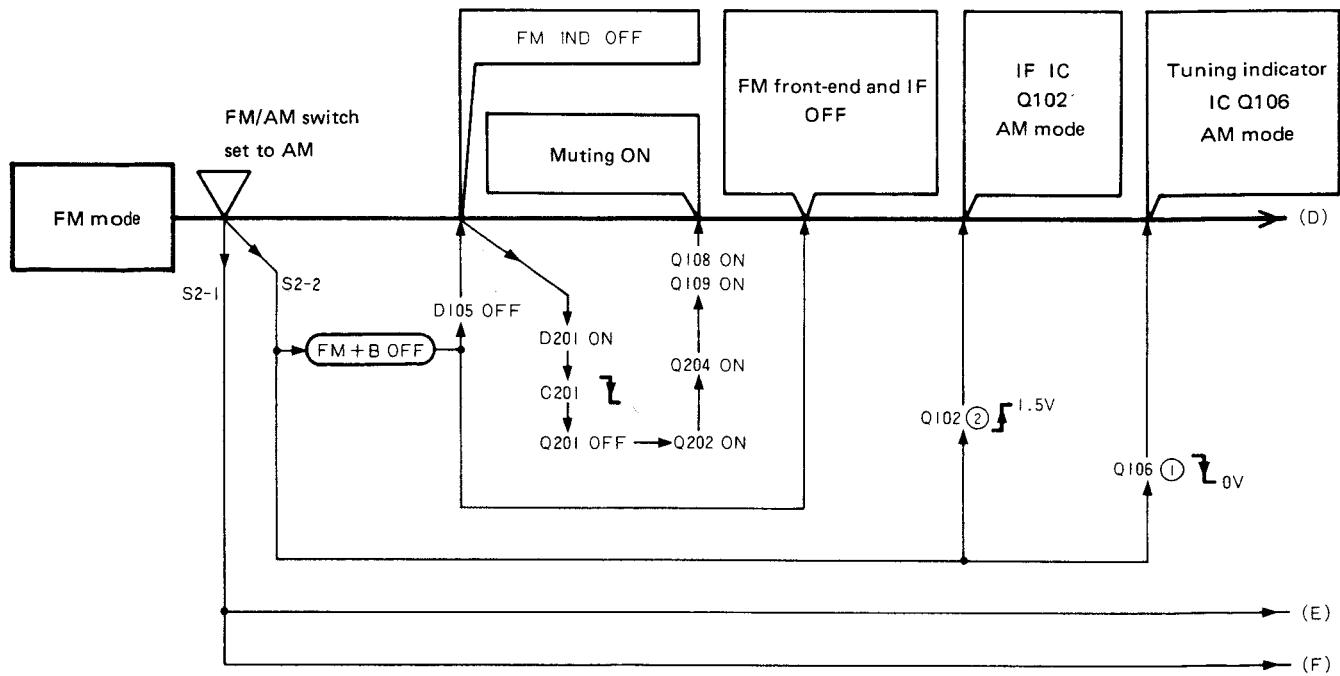
## FM Tuning Operation



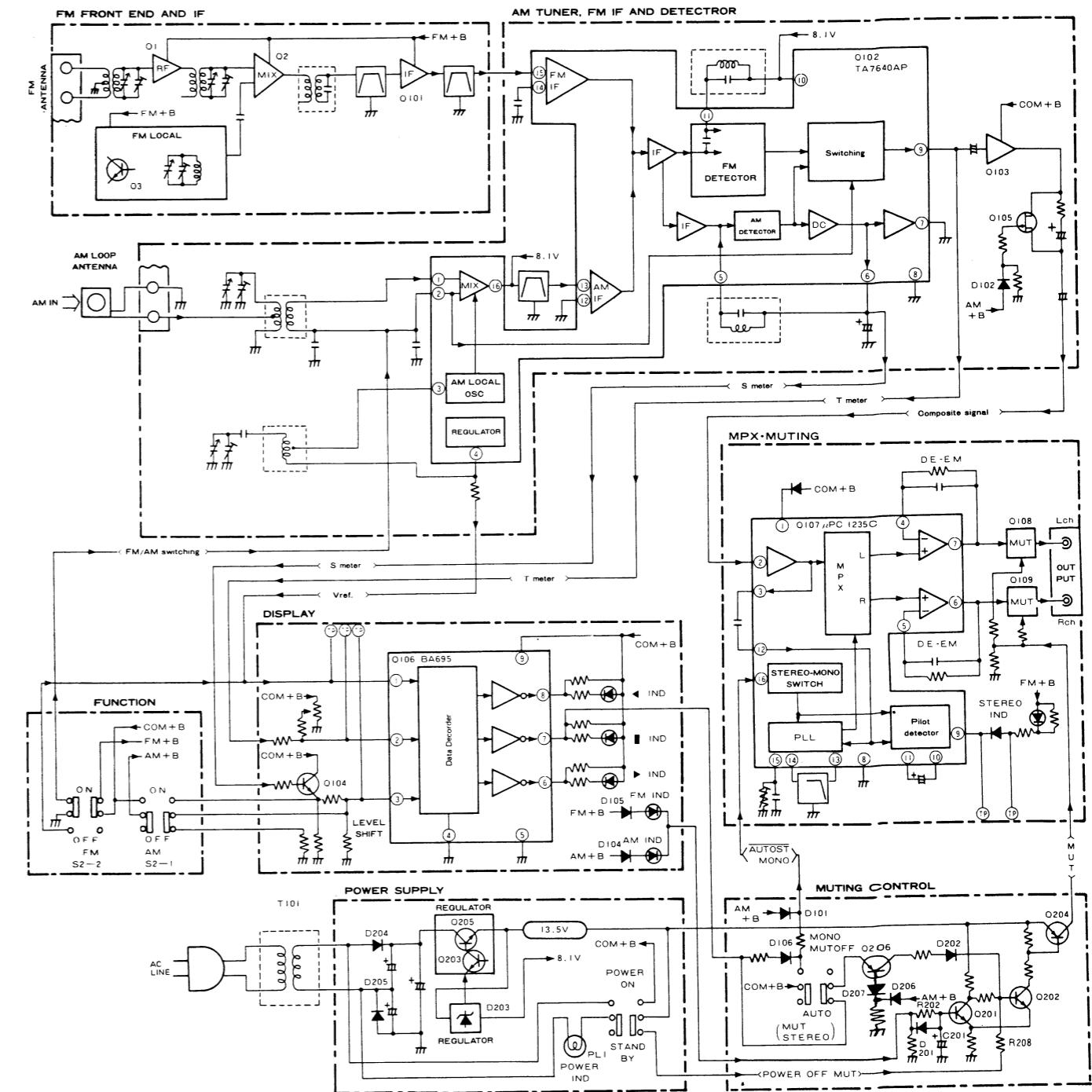
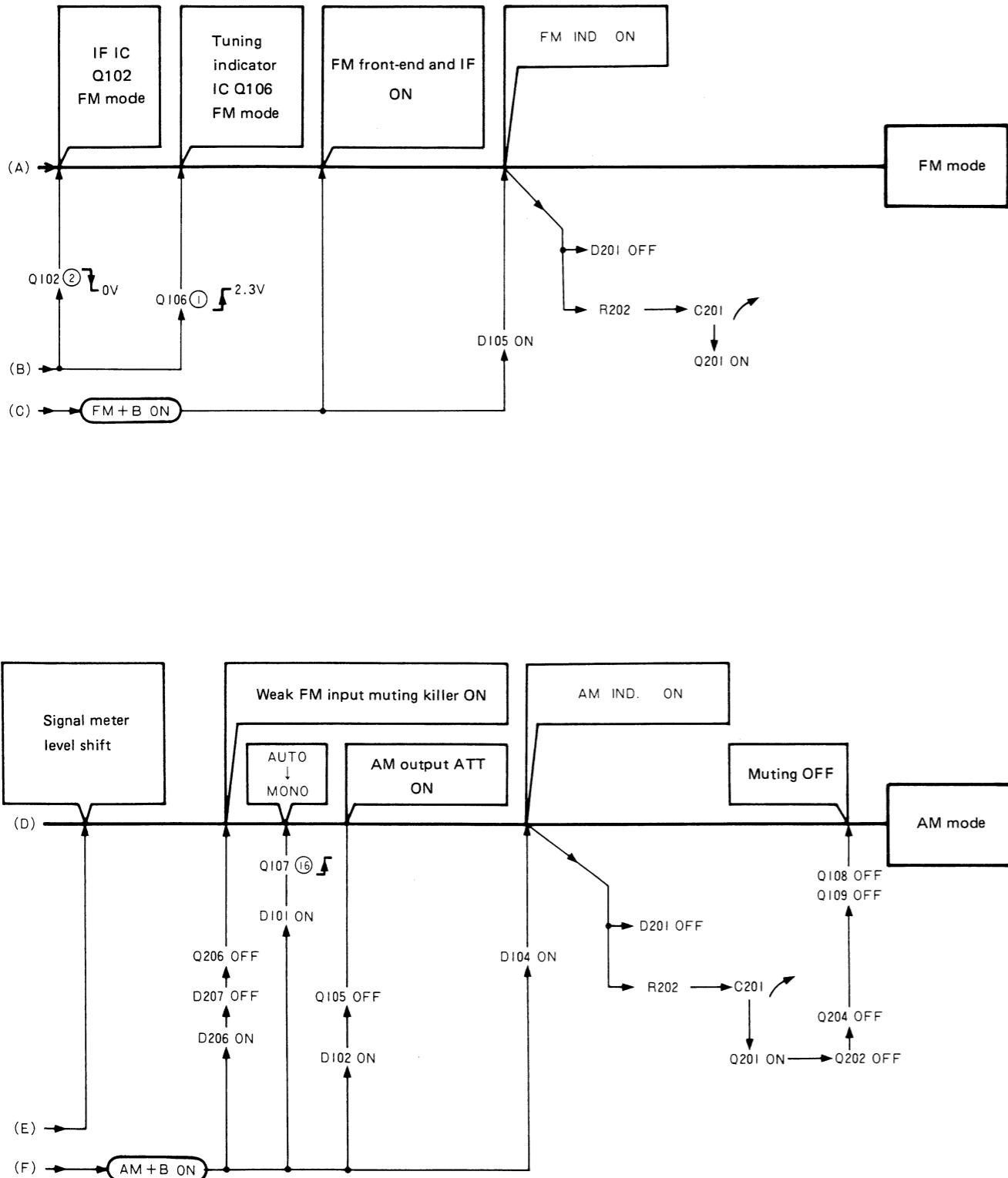
AM  $\rightarrow$  FM



**FM  $\rightarrow$  AM**



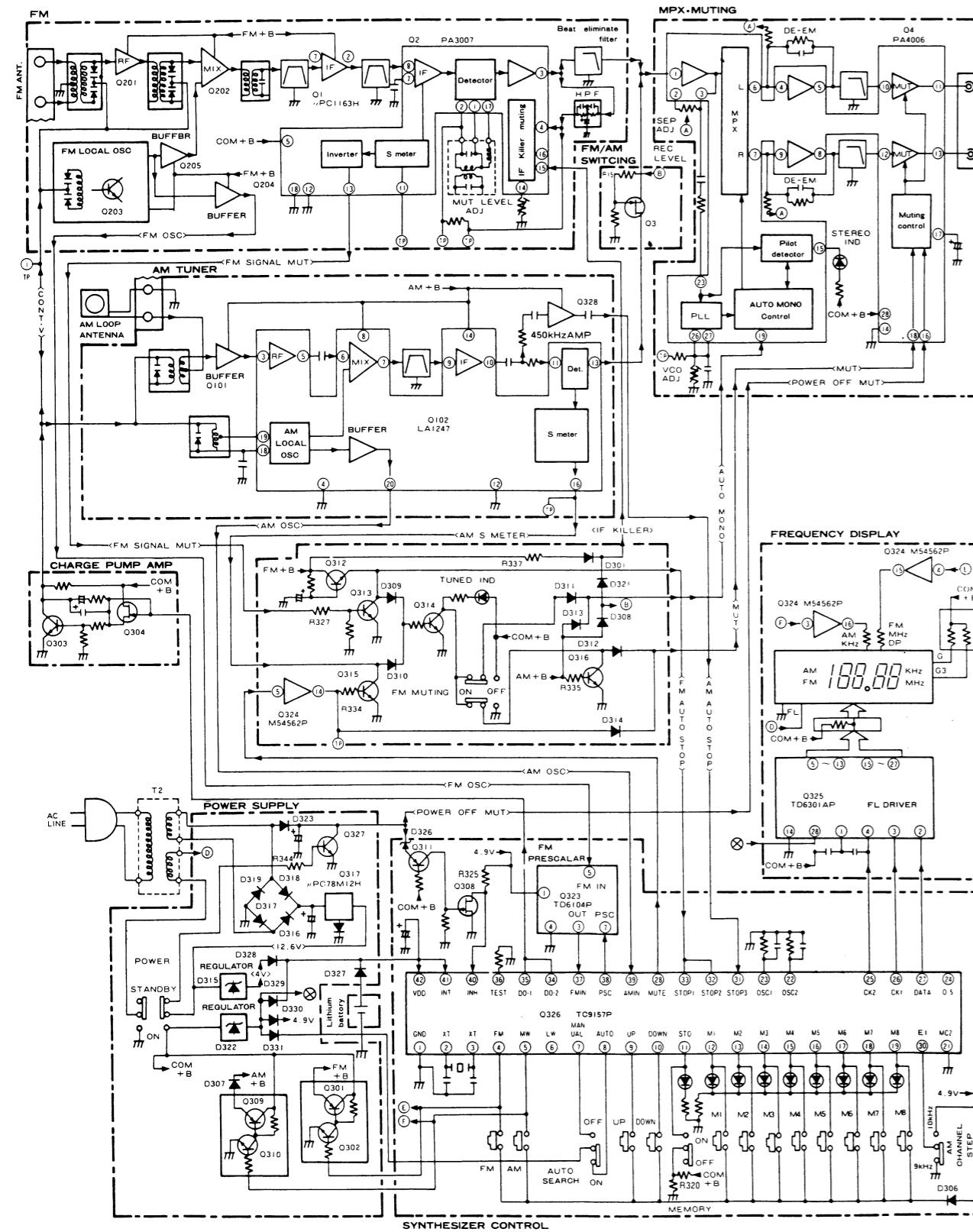
### 1.3 BLOCK DIAGRAM FOR TX-540 AND F-50



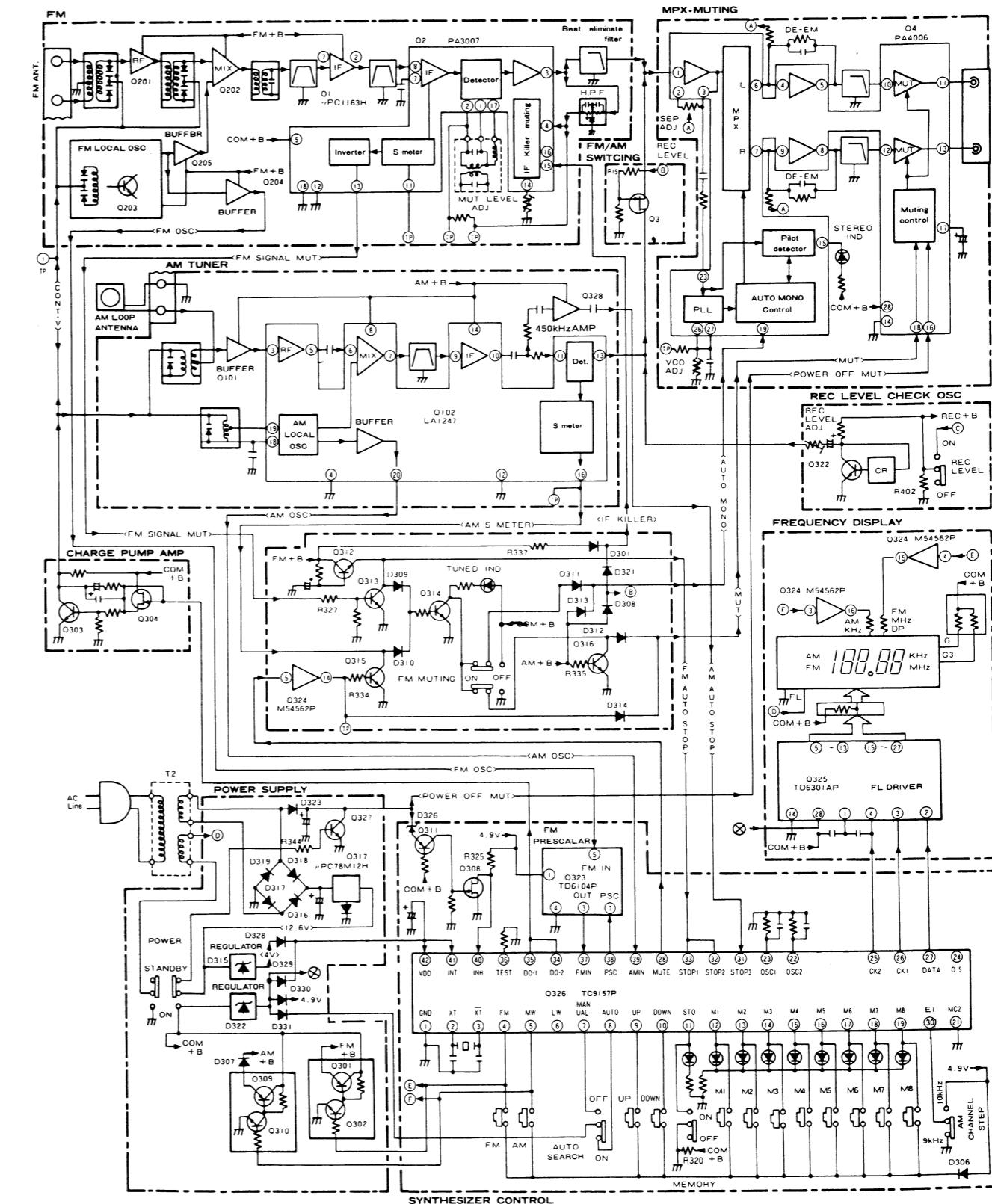
## 2. TX-940 AND F-70 CIRCUIT DESCRIPTION

### 2.1 BLOCK DIAGRAM

TX-940

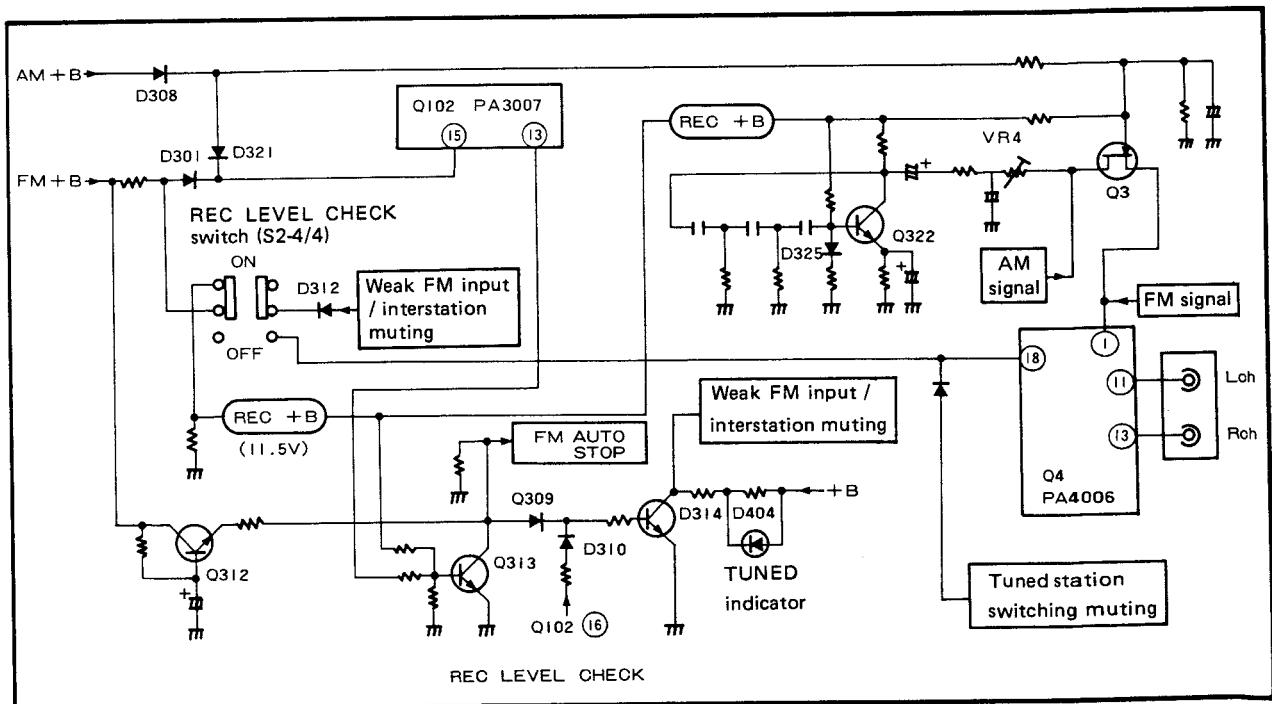
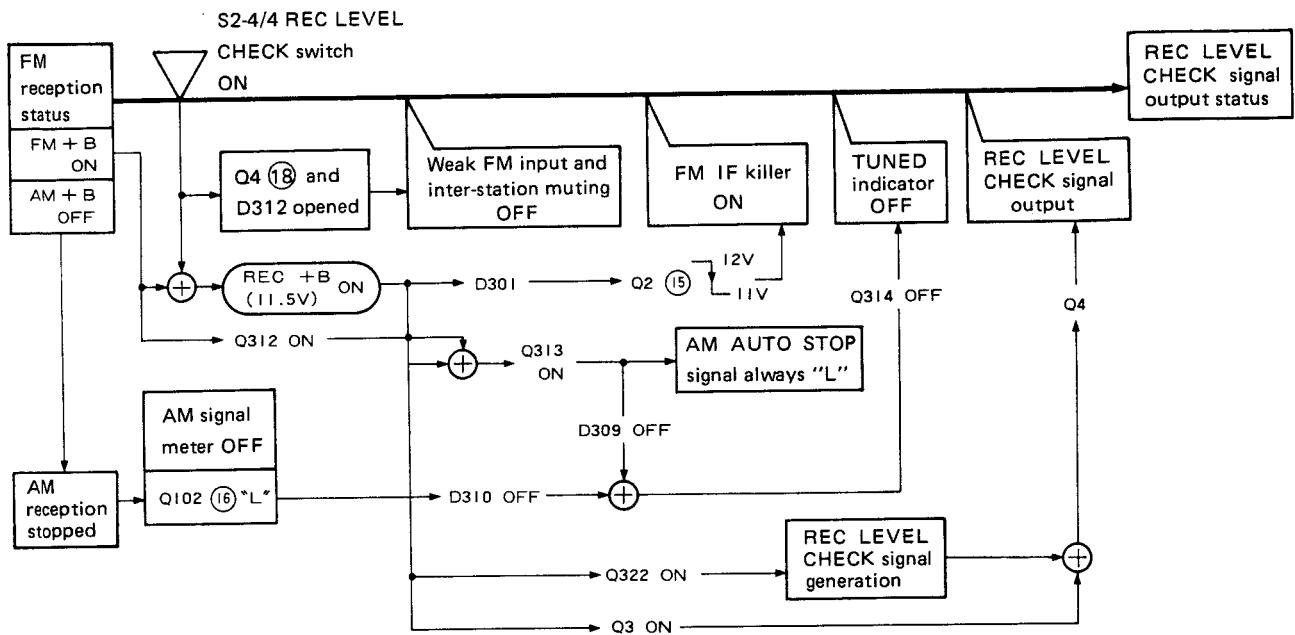


F-70

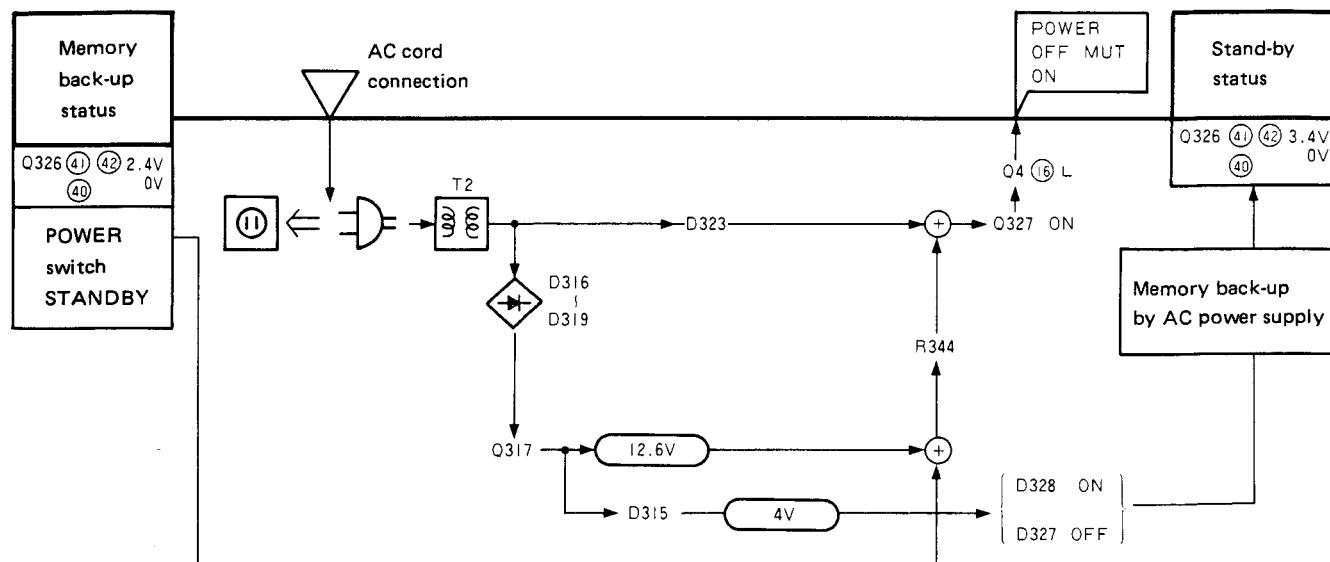


## 2.2 OPERATION FLOWCHARTS (See block diagram on pages 9 and 10)

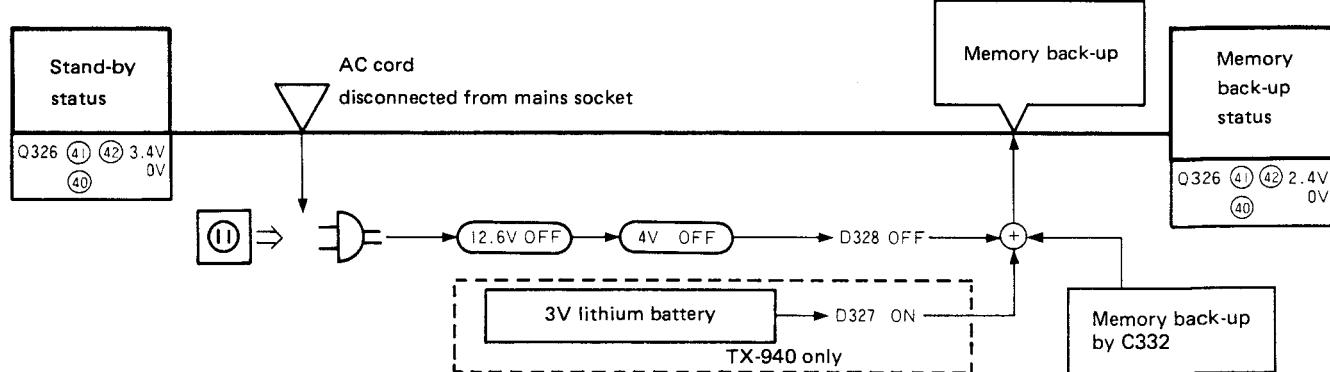
FM → REC LEVEL CHECK Switch ON (F-70 only)



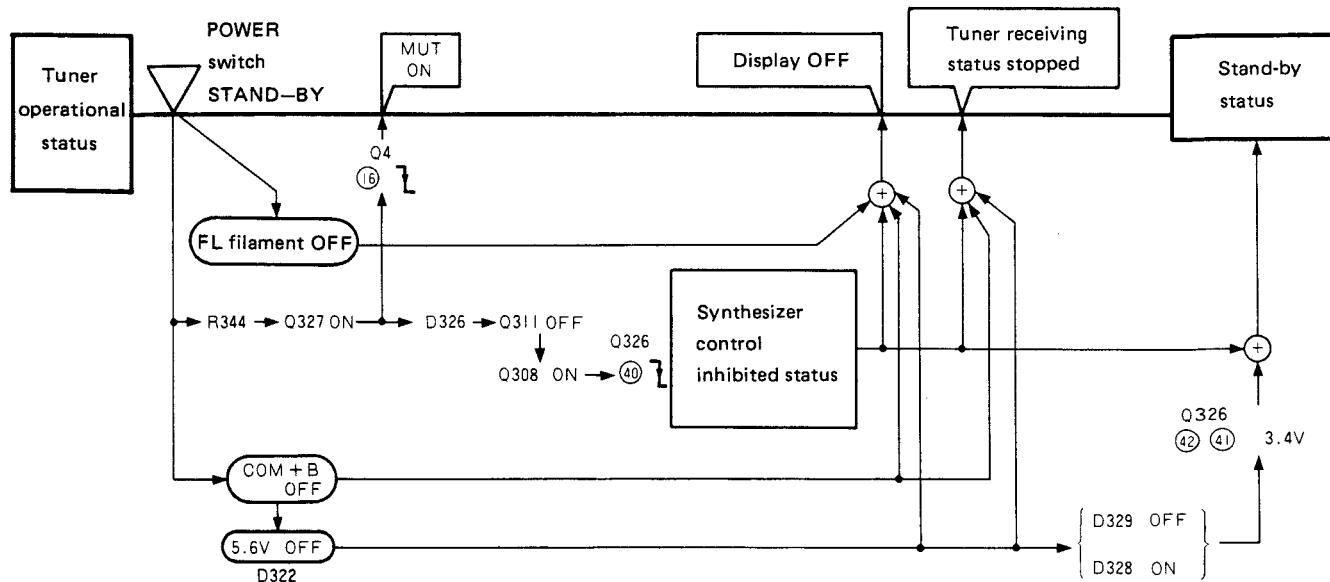
## AC Cord Connection



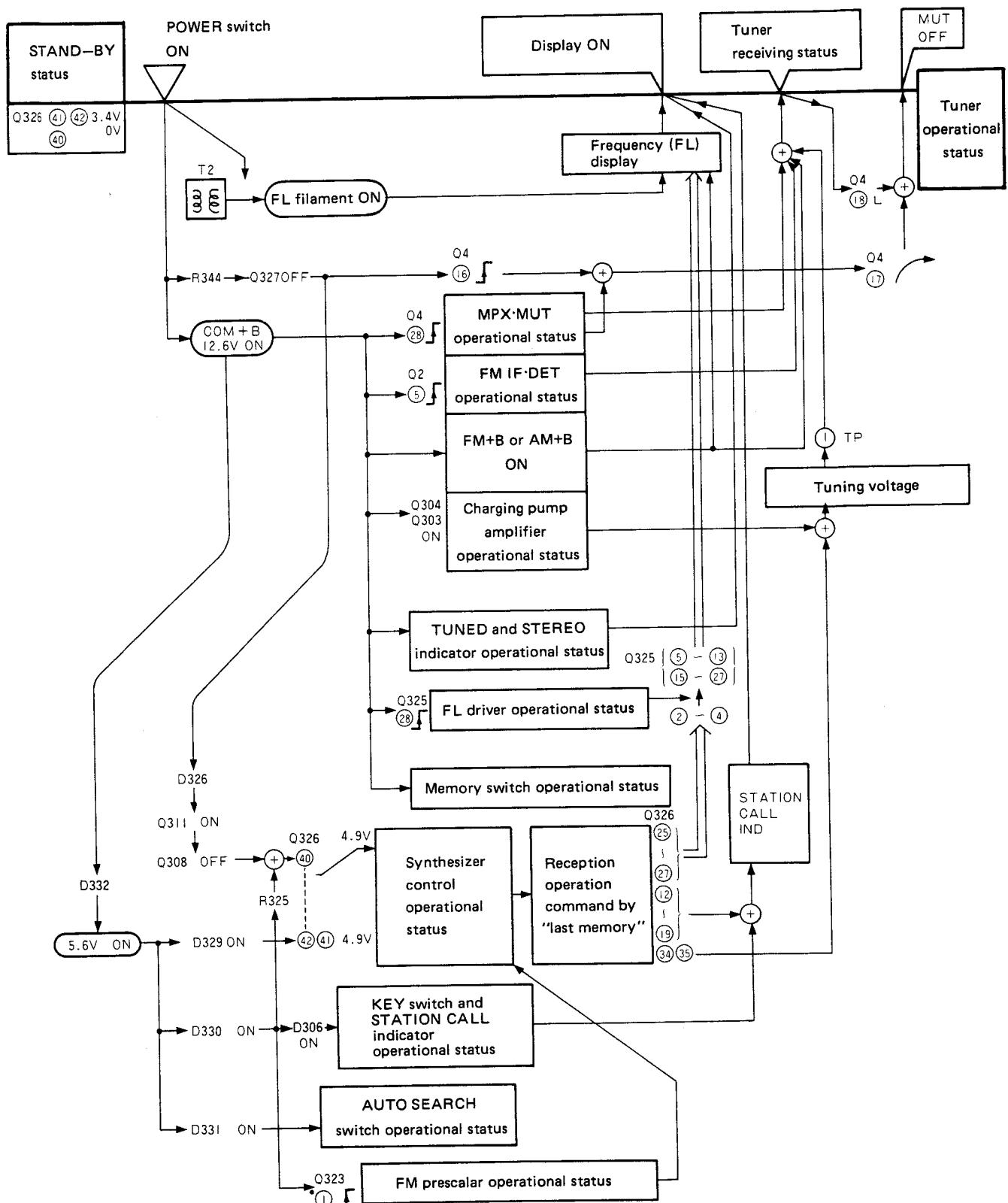
## AC Cord Disconnected



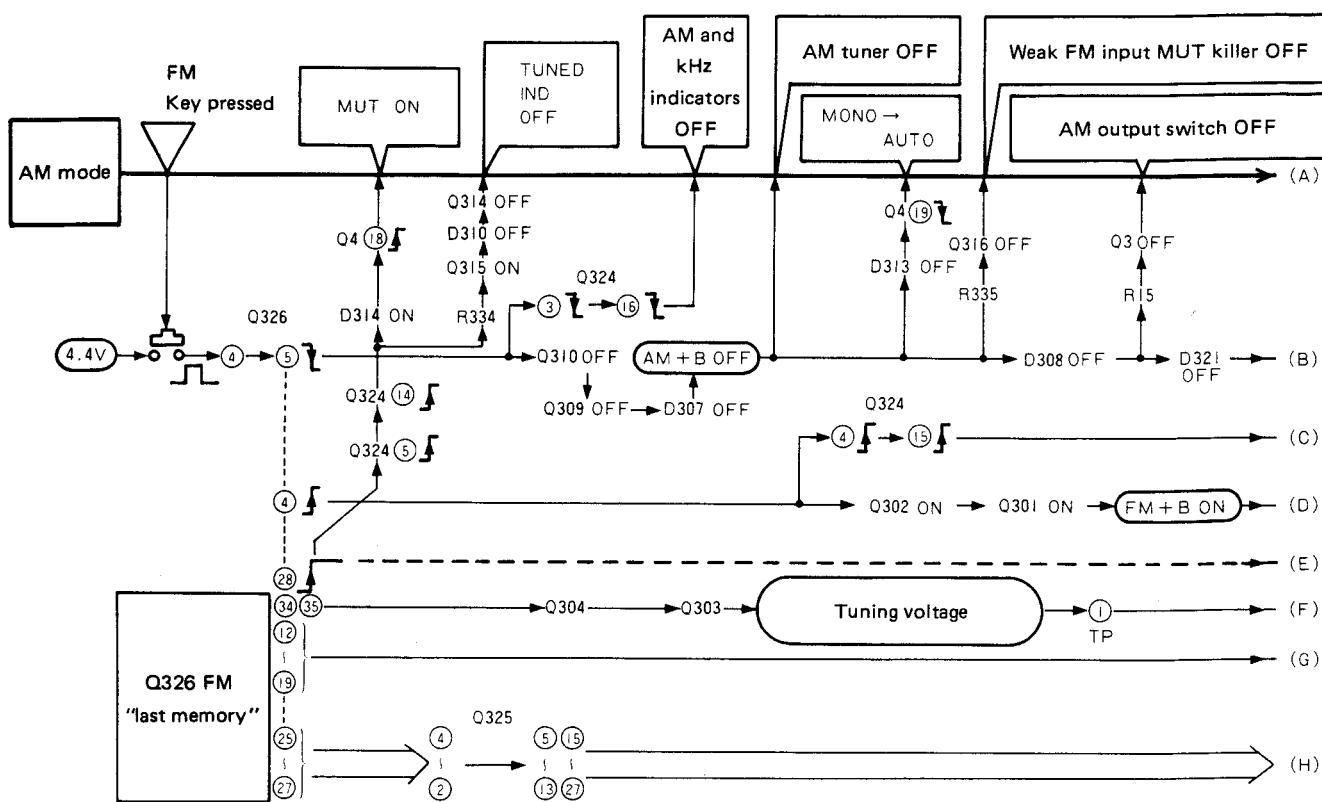
## POWER ON → STAND-BY



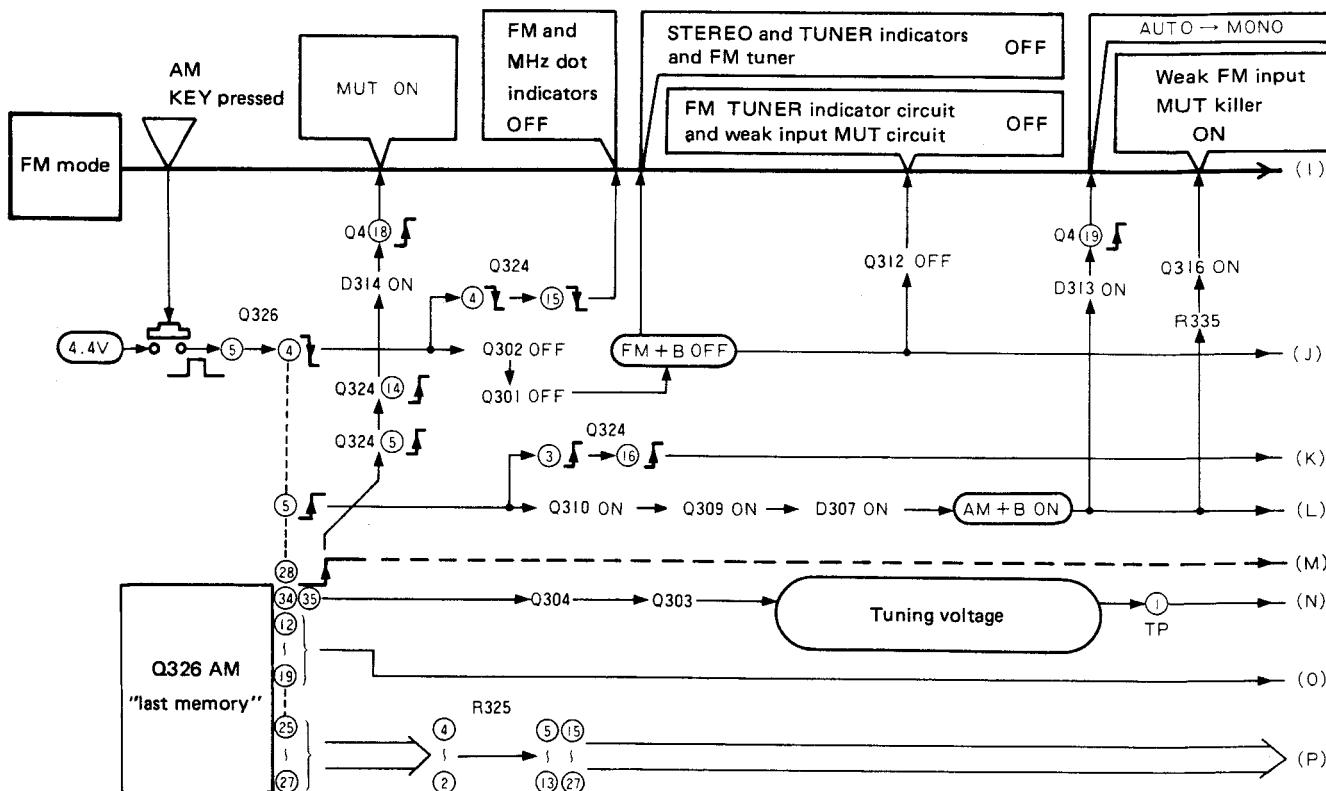
POWER STAND-BY → ON

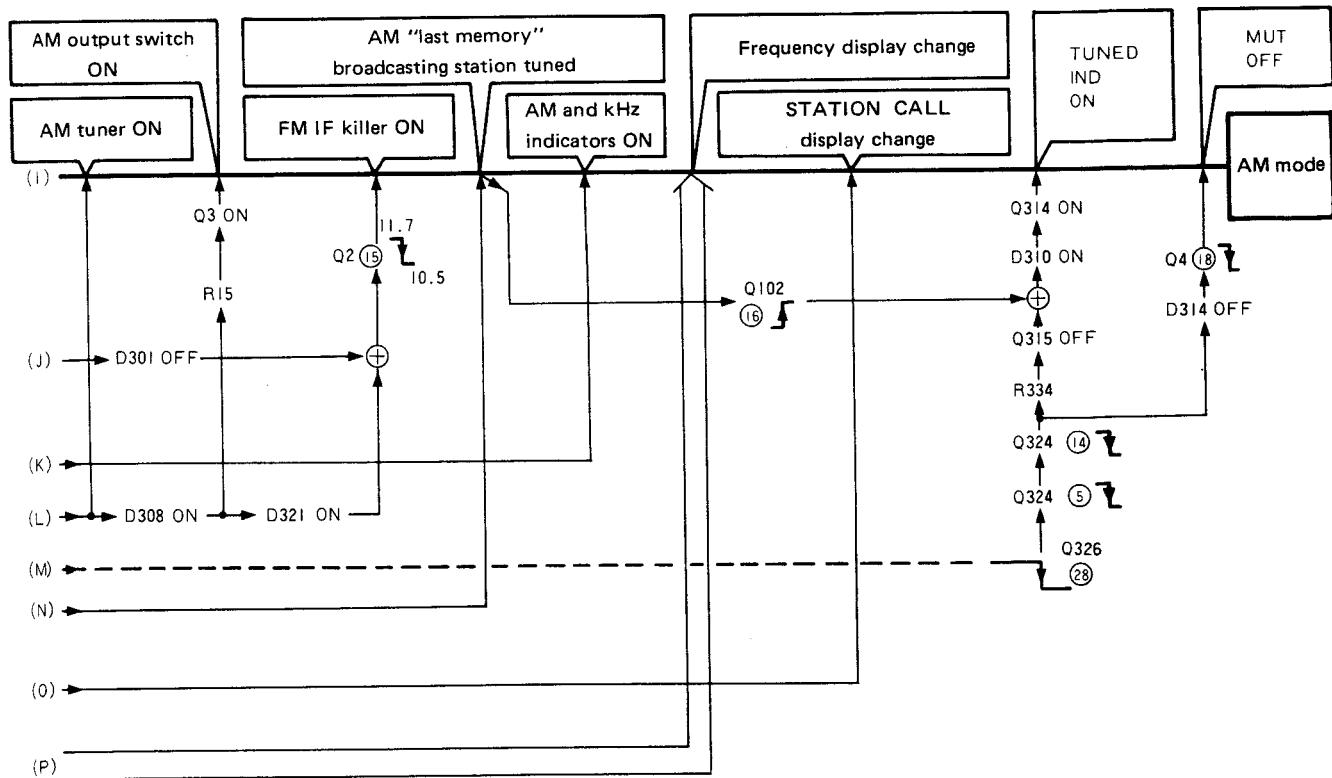
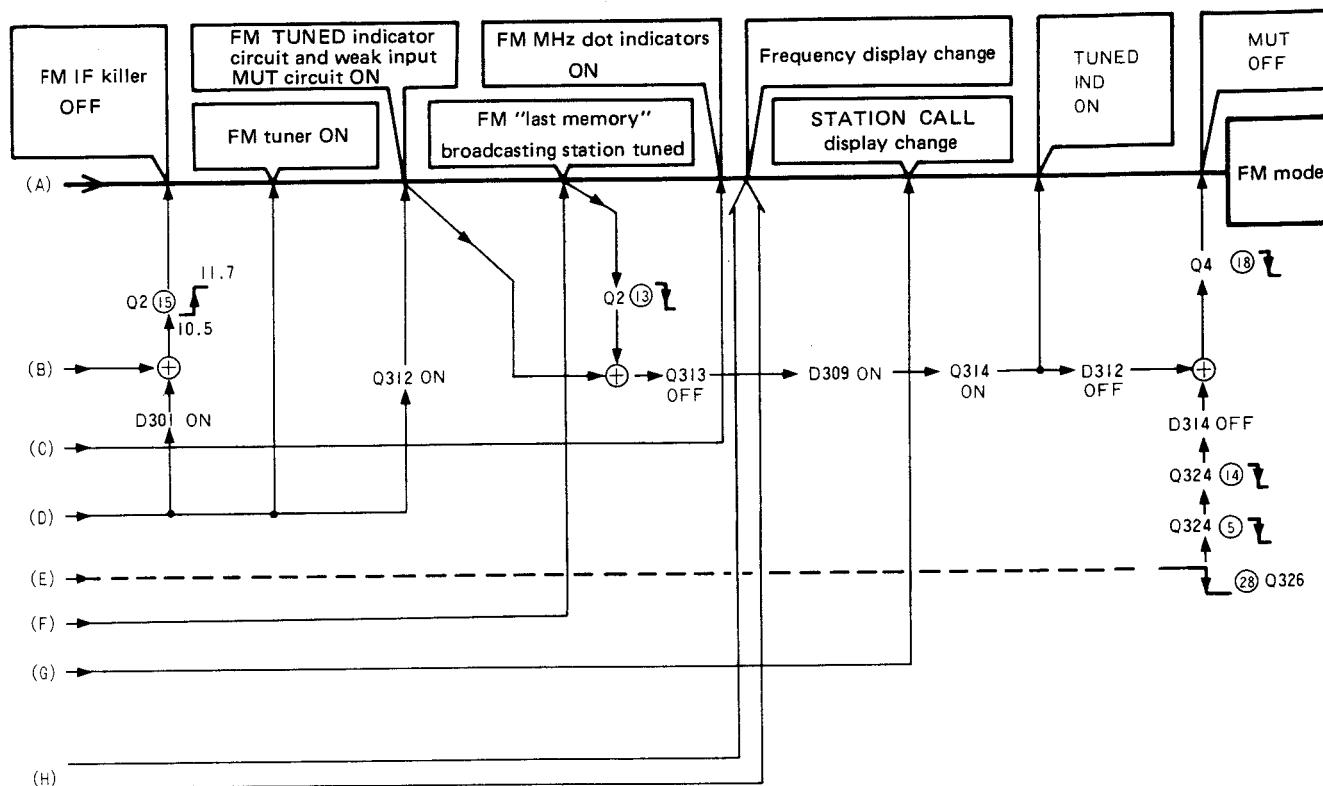


## AM → FM

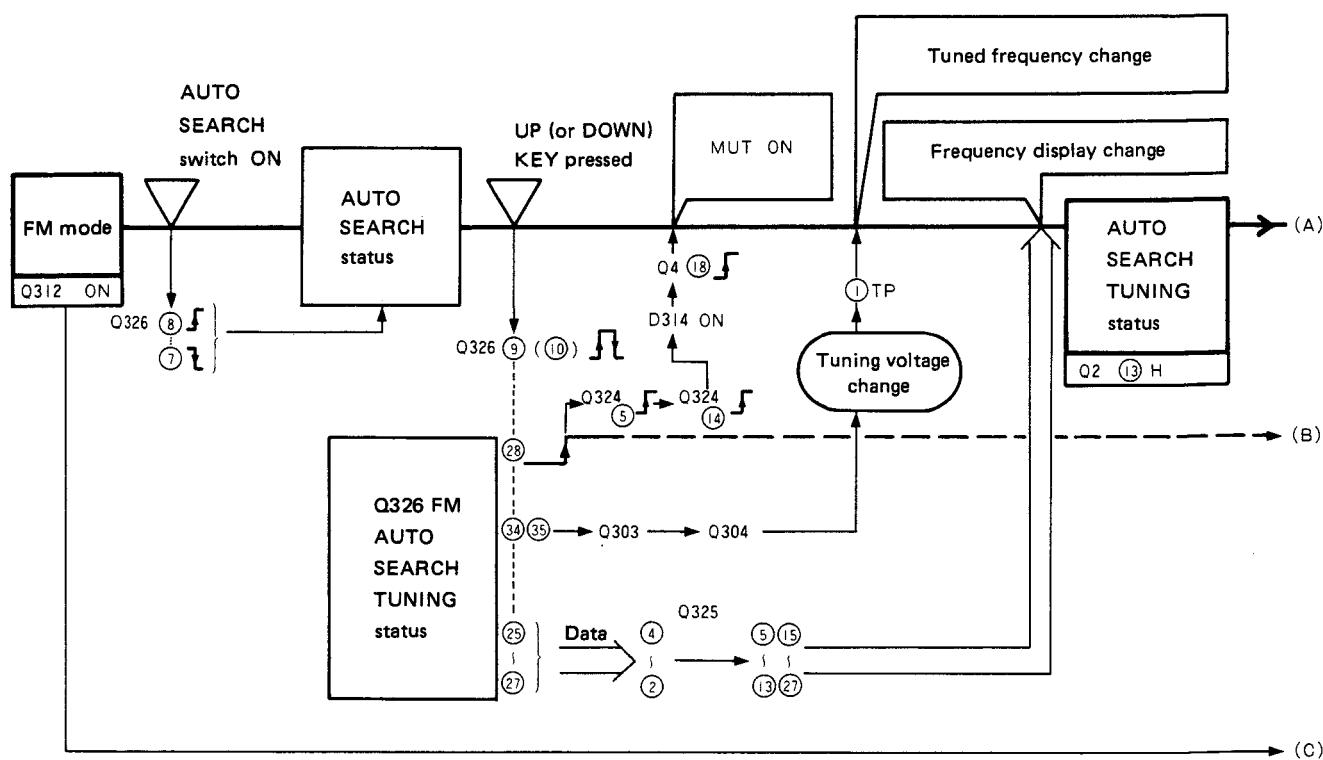


## FM → AM

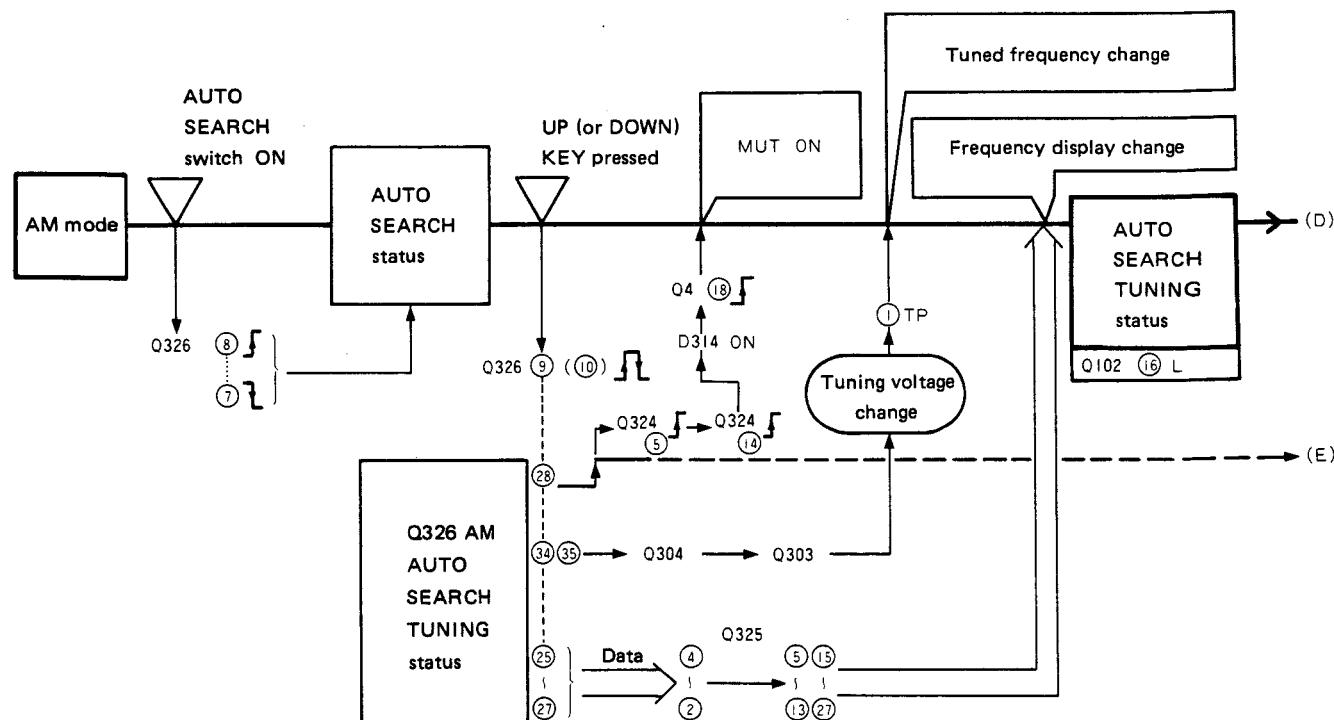


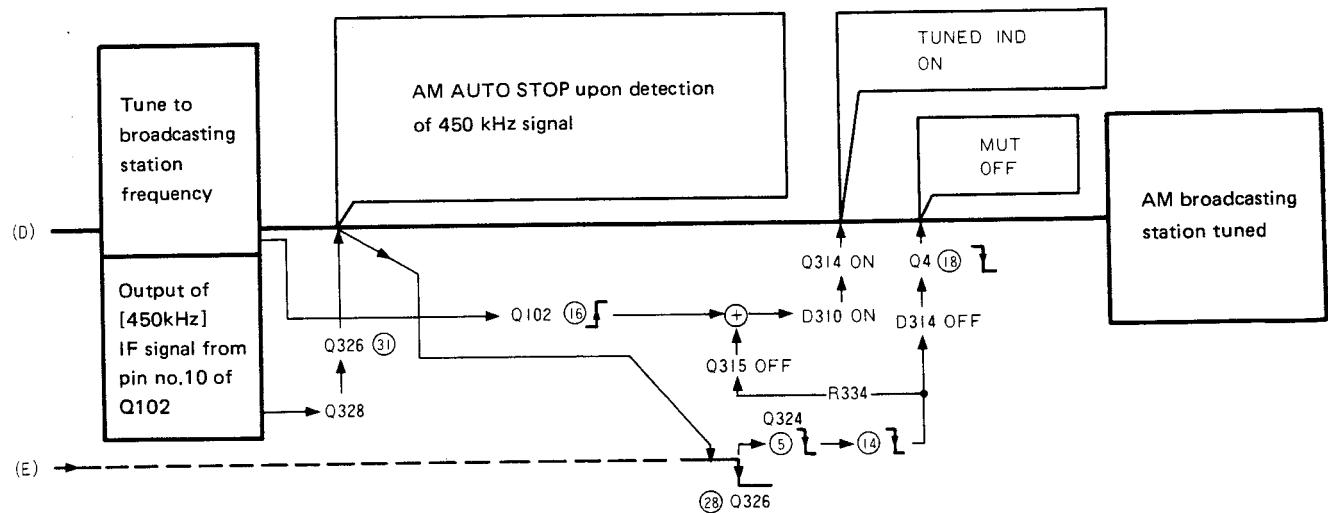
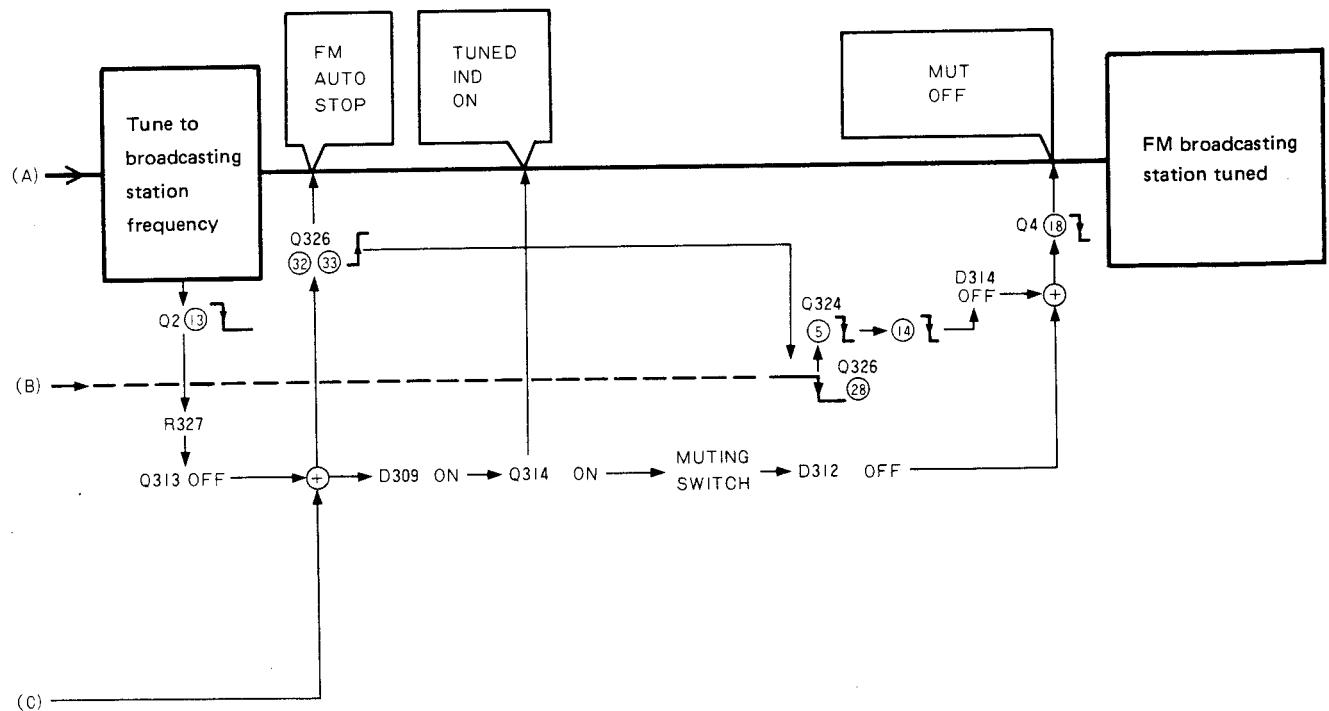


## FM AUTO SEARCH TUNING Operation

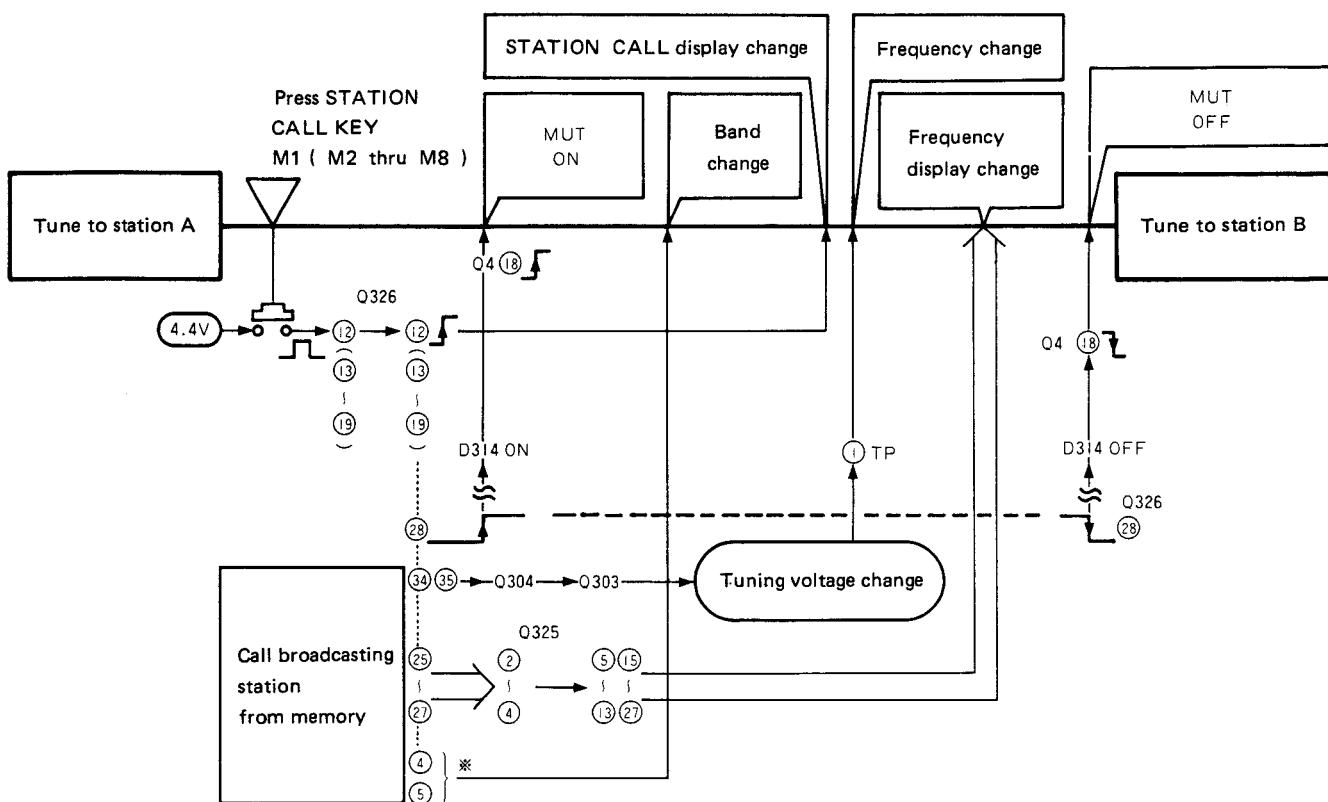


## AM AUTO SEARCH TUNING Operation





## STATION CALL Operation



## Memory Operation

